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INTRODUCTORY

THE study of obstetrics, and the pathology, diagnosis and treatment of the diseases of women, has of recent years made great progress, in which British science and skill have played a prominent part. Nevertheless, it cannot be said that these important subjects are well represented in British serial literature. Several flourishing societies in the Empire are devoted to midwifery and the special ailments of womankind, and articles on pregnancy and labour and the treatment of uterine and ovarian tumours are prominent in the columns of the general medical newspapers. The archives of more than one association founded for the promotion of the same branch of medicine contain matter of high interest and value. Still, a special journal, independent of any society, remains unknown in our medical literature. The aim of the JOURNAL OF OBSTETRICS AND GYNÆCOLOGY of the British Empire will be to supply that want. As its promoters declare in their prospectus, our endeavour will be to make this publication a complete and impartial record of British work, an exponent of British obstetrical and gynæcological practice, and a summary of contemporary thought and achievement in obstetrics and gynæcology throughout the world.

Consistently with the aims of the journal, as expressed above, special prominence will be given to original essays by experienced workers in the United Kingdom and in the British Dominions

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beyond the seas. We look forward to communications on the pathology of the pelvic organs as well as to sound clinical work. At the same time, welcome will be given to any short note of a case shown by the author to be of unusual interest, and to reports of any new operative procedure, or modification of an older procedure, which can be proved to be not only skilful operating, but also sound surgery. In respect to treatment of any kind, that essay will be preferred in which remote results are the most fully reported.

Whilst the original contributions will be the work of British obstetricians and gynæcologists, a considerable portion of each number will be set aside for abstracts of the writings of American and foreign authorities. The editorial staff will endeavour to supply the readers of the journal with a condensed record of the most recent papers and reports, selected from foreign newspapers and magazines. Thus, the actual condition of obstetrics and gynæcology at home and abroad may be compared, and the reader will be kept acquainted with the valuable researches constantly in progress in Continental schools of medicine and in the United States of America.

AN ANALYSIS OF ONE HUNDRED CASES OF UTERINE FIBRO-MYOMA,

IN WHICH THE CONDITION OF THE TUMOURS AND THE COMPLICATIONS TO WHICH THEY HAD GIVEN RISE WERE VERIFIED BY OPERATION.

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The following paper is offered as a contribution to the natural history, rather than to the surgery, of uterine fibro-myomata. Questions of surgical technique, however interesting, are at the present moment of less importance than the larger question of the indications for operating. We are told, on the one hand, that these tumours are for the most part absolutely harmless, and that their removal is only necessary and justifiable in certain rare instances in which they are producing symptoms dangerous to life. We are told, on the other hand, that it is our duty to unlearn all that we have been taught as to the innocence of uterine fibro-myomata, as to their tendency to undergo spontaneous cure after the menopause, and as to their being very rarely fatal, and that 'the best treatment of fibroid tumours in general is their early removal.' Where opinions differ so widely, how are we to be guided to a correct judgment? Obviously, what is needed is a more accurate knowledge than we at present possess of the life-history of these tumours, and such knowledge can only be gained by the observation and record under favourable conditions of considerable numbers of cases. An analysis, for example, based on a fairly long series of operations, in which the tumours have been actually seen, handled and laid open, and their relations to the uterus and to other parts and organs demonstrated, and in which the facts observed have been carefully recorded, would seem to offer at least something in the required direction. Such an analysis I have here attempted.

The idea was suggested to me by an article* contributed by my friend Dr. Noble of Philadelphia to the *American Journal of Obstetrics* (vol. xliv., No. 3, 1901). In that article an analysis is presented of a series of 218 cases of operation for uterine fibroids, 'showing the degenerations in the tumours and the various com-

* 'The Complications and Degenerations of Fibroid Tumours of the Uterus as bearing upon the Treatment of these Growths.'

plications encountered.' I am not aware that any similar analysis of his cases has been published by an operator in this country, and I shall be glad if others are induced to place on record the results of their individual experience. In this way we may hope gradually to accumulate a very valuable series of facts on a sufficiently large scale to warrant us in drawing definite conclusions.

Before going any further, it is desirable to point out that the proportion of unhealthy tumours and of serious complications is necessarily much larger in this series than in cases of uterine fibro-myoma taken generally. The cases embraced in this series were all of them either cases admitted to the hospital on account of their presenting some features of special gravity, and then adjudged to be in need of an operation, or they were private cases in which an operation had been advised. Hence, they were selected cases, and in many instances had undergone a double process of selection. But there is even a further reason for considering them as coming within a special category. Wherever the process of selection goes on, the personal factor necessarily comes into play. One operator will have a different standard of requirement from another in judging of the need for operation. It happens in my own case that I have been somewhat exacting in regard to the indications for operation. I am not now considering whether I have been right in this; I simply state the fact. The series must therefore be regarded as consisting largely of cases of unusual gravity, and the proportion of serious complications cannot and must not be taken as representing the proportion amongst fibro-myomata in general. Notwithstanding its limitations, however, and the need for care in drawing inferences from it, the record will, I believe, not be without a certain value.

The fact of the number of cases being exactly 100 suggests that they have been chosen more or less arbitrarily out of a larger series. But such is not the case. This number happens to represent all the cases that I have operated upon up to the present moment, *minus* those that have been intentionally excluded as not fulfilling the necessary conditions of the inquiry. I have performed, for example, twenty-five oöphorectomies for uterine fibro-myomata, but these have all been excluded on the ground that no opportunity was afforded of seeing the interior of the tumours and verifying their nature and condition. Five cases in which the operation went no further than an exploratory incision are excluded for the same reason; and one case of Cæsarean section for fibro-myomata is excluded because, although the patient died, no post-mortem examination was permitted, and the tumours, therefore, could not be properly examined and described.

Another case, operated upon by abdominal hysterectomy, is excluded because the specimen was selected for the museum, and was ordered to be mounted without being opened.

It seemed to me that it would be better also to exclude from the series cases of fibroid polypus removed *per vaginam*. These cases form, in my opinion, an entirely different category. There are no unsettled questions in reference to their treatment as there are in reference to that of other varieties of uterine fibro-myomata. No one, for instance, doubts the necessity for operation in *every case*. Moreover, the frequency with which, owing to causes which are well understood, polypi are met with in a sloughing condition would have swelled unduly the number of necrotic cases, and proved misleading. Having decided to exclude polypus cases, I have also excluded a case of abdominal hysterectomy in which the removal of the uterus was merely an incident in the treatment of a case of polypus, having been necessitated by the development of serious symptoms after a vaginal operation.

I am sorry to have taken up so much time and space with these details, but it appeared desirable to make it perfectly clear on what grounds cases not thought suitable for the purposes of this inquiry had been rejected. This was the more necessary because Dr. Noble has included in his series all the cases in which he has operated for fibro-myoma uteri, not even excepting his cases of fibroid polypus.

The cases upon which the present analysis is based cover a period of about ten years (1892 to 1901, both included), and comprise: 89 abdominal hysterectomies, 9 abdominal myomectomies, 1 Cæsarean section, and 1 exploratory incision = 100 cases.* The two last-named were able to be included because in each case there was an autopsy. The cases rejected, as not complying with the terms of the inquiry, include, in addition to the cases of fibroid polypus (the number of which I cannot at this moment give), 25 oöphorectomies, 5 exploratory incisions, 2 abdominal hysterectomies, and 1 Cæsarean section.

I will take as the first subject of inquiry the condition of the tumours themselves. In forty-six cases out of the hundred the tumours were found to be healthy, and, as far as could be seen by the naked eye, typical in their structure. In two cases the growth was unusually vascular, and was diffused through the uterine muscle,

* The series contains no cases of vaginal hysterectomy, for the simple reason that, in the few instances in which that operation has been performed for fibro-myomata at St. Thomas's Hospital, the case was transferred under a mutual arrangement to my colleague, Dr. Walter Tate.

there being no capsule or definite boundary; whilst in no fewer than fifty-two cases, or rather more than one-half of the whole series, the tumours had undergone some form of secondary (degenerative) change. The cases in which the tumours were healthy need no further remark at present. Some of them had complications which will be mentioned in their proper place.

The two cases in which the growth was vascular and non-capsulated form a class by themselves, and are of sufficient importance and rarity to justify me in appending a brief account of them.

Case 1.—The patient, E. H., was a married woman, aged fifty-five. Menstruation had always been painful and profuse, and, notwithstanding her age, showed no sign of abating in quantity or diminishing in frequency.* She had borne three children at term, and had had one miscarriage. For the last seven years before her operation the hæmorrhage and pain at the periods had been so great that the patient was obliged to remain in bed during the whole nine days that the period lasted. Four years previously the patient, then fifty-one, had consulted me about a tumour in the hypogastrium (which she had first noticed about three years before), and told me her symptoms. I advised her to wait for the menopause, which did not seem likely to be long deferred. The symptoms, however, continued to increase, and in January, 1894, she was admitted into St. Thomas's Hospital.

The anterior wall of the uterus was thickened and enlarged by a firm tumour, which, on dilating the uterus, was felt to project into the cavity as a smooth, hard, rounded swelling. The sound passed a distance of $4\frac{1}{2}$ to 5 inches. The interior of the uterus was curetted, and some soft villous growths were removed. The patient left the hospital fairly well, but three weeks later, whilst away from home, she had a very severe hæmorrhage which lasted a month. This was followed by two other severe hæmorrhages. A condition of profound anæmia resulted. On one occasion she was discovered by her husband, on his return from work, in a state of such profound syncope that for some time he thought her dead. She was readmitted to the hospital, and after a month's rest in bed—viz., on March 14, 1895—abdominal hysterectomy was performed.

The uterus measured 3 inches in vertical, $3\frac{1}{4}$ inches in antero-posterior, and $4\frac{1}{2}$ inches in transverse, diameter. Its circumference measured $11\frac{1}{2}$ inches. The main mass of the tumour consisted of a fibro-myomatous growth infiltrating the whole uterus, and extending from mucous membrane to peritoneum. There was no evidence of any normal uterine tissue such as usually surrounds this form of tumour, and it was found impossible to enucleate the mass. There projected from the lower and posterior part a rounded fibro-myoma, capsulated and easily separable. Another small tumour, which could be readily enucleated, was situated on the right side of the main mass. The uterine canal was situated in the posterior part of the tumour, and was greatly expanded. The mucous membrane was smooth. The Fallopian tubes were normal. Both ovaries were small and atrophied. On section, the tumour was very firm, had a grayish-white colour, and presented an irregular network of interlacing fibres. The two small enucleable fibro-myomata showed a more concentric arrangement of fibres, and were whiter in colour. Microscopically, the

* It is worthy of note that, of the patient's six sisters, only two had as yet reached the age of fifty, and that of those two one had continued to menstruate until fifty-three, and the other until fifty-eight.

tumour consisted chiefly of a mass of spindle-shaped muscular fibres interlacing in an irregular manner, with a comparatively small amount of fibrous tissue, and some connective-tissue cells. Scattered through the tumour were several large circular or oval spaces, which were venous sinuses cut across. In one or two places early myxomatous change was seen to have occurred.

Five years after the operation the patient reported herself to be 'very well indeed.' The specimen was exhibited at the Obstetrical Society of London, April 3, 1895, and an account of the case was published in the society's *Transactions*, vol. xxxvii., 1895, pp. 143-146.

Case 2.—The patient, Mrs. L., had been under my observation for thirteen years, and had been known to have a tumour all that time. She had never been pregnant, and at the time of her operation in June, 1895, she was forty-five years of age, and had been a widow for twenty-two years. When I first discovered the tumour in 1882, I was uncertain as to its nature, but the following year I made it out definitely to be a fibro-myoma of the anterior wall of the uterus. At the end of 1888 the tumour reached 1½ inches above the umbilicus. There was a little increase in the menstrual flow, but otherwise no inconvenience. In 1891, there had been no marked increase in the size of the tumour, but the general health was obviously beginning to suffer, and the advisability of an operation was discussed. The patient dreaded the idea, and three months later was so much better both in health and spirits that the question was no longer entertained. In May, 1895, however, when she came to see me after an interval of nearly three years, I found her so wretchedly and alarmingly ill, anæmic, and emaciated, and so depressed in spirits, that I strongly advised removal, suspecting that some secondary change was taking place in the tumour. The patient thought it over, and a month later came into a private nursing home for operation. She had no actual pain in the tumour, but she was in constant discomfort, and the monthly loss was profuse. The summit of the tumour was now 4 inches above the umbilicus.

The tumour was interstitial, and weighed, with the body of the uterus, 7 pounds 5 ounces. On section, it was seen to be of fairly uniform consistence, firm, and very vascular. No line of demarcation could be made out between the tumour and the uterine tissue proper. No microscopical examination was made.

In 1899, the patient had a good deal of pain, and a swelling formed in the neighbourhood of the stump, which I feared might prove malignant. In June, 1900, however, five years after the operation, the lump had practically disappeared, the uterine stump was quite movable, and the patient had regained her usual health.

The cases in which secondary changes had taken place may be grouped under the following headings, viz.:

Œdematous and myxomatous	27	
Myxo-sarcomatous	1	
Cystic or fibro-cystic...	5	
Calcareous	1	
Necrotic, subdivided into—		
(*a*) Necrobiotic	15	18
(*b*) Infected	3	
		52

All classifications of these secondary changes must, to a certain extent, be arbitrary, for the difference is not seldom one of degree rather than of kind, and whenever this is the case there must be doubtful or borderland cases that would be placed in one category by some, and in another category by others. It will be well, therefore, that I should indicate here the principles by which I have been guided in constructing the above list.

Under the heading 'œdematous and myxomatous' are classed those tumours which showed general myxomatous softening, and from the surface of which there exuded, on section, a clear yellowish fluid. Œdematous is not perhaps the best word to designate this curious change, which is not an œdema as ordinarily understood, but the term is in common use for this purpose, and it was thought better to retain it.

In one case this form of degeneration had reached an extreme degree, 3 pints of serous fluid escaping from the tumour during its removal, and the only solid structures that remained after the fluid had all drained away being the capsule of the tumour and a small handful of 'delicate, easily torn membraniform connective-tissue.' The patient had seen me from time to time for several years, but had refused to have any operative treatment until the symptoms had become very severe, and the tumour had caused an enlargement of the abdomen greater than that of a full-term pregnancy. The case will be found recorded in the *Transactions of the Pathological Society*, vol. xliv., p. 120. On the authority of Mr. Shattock, who examined the specimen very carefully, the case is here classed under the heading of 'myxo-sarcoma.'

Where the tumours were seen, on section, to contain, amidst much ordinary fibro-myomatous tissue, distinct spaces filled with fluid, they have been classed as 'cystic or fibro-cystic.' These spaces have no distinct lining membrane, and are not true cysts, but the terms 'cystic' and 'fibro-cystic' have long been used in this connection, and it would be pedantic to endeavour to supplant them. As these cases of cystic fibro-myoma are of considerable interest, and are only few in number, I append short notes of them:

Case 3.—In this case the tumour grew from the cervix, the body of the uterus remaining entirely free. The patient was a single woman, aged forty-nine, of dark complexion, and spare habit. Menstruation had never been excessive. The catamenia last appeared six months before the operation, which took place September 19, 1895. The patient's health had been excellent up to eighteen months before, when she first began to suffer from abdominal pain and from piles. She first discovered a lump about twelve months ago, but she had not noticed any marked enlarge-

ment of the abdomen until the last six months, during which time its size had increased rapidly. For about the same time (six months) she had had a good deal of pain in the umbilical region and about the rectum. There had been no pain or difficulty, however, in regard either to micturition or defæcation. The abdomen was symmetrically distended by a large centrally-situated and ill-defined swelling, in the upper portions of which there was evidence of the presence of fluid. On vaginal examination, the uterus was found displaced upwards, the vaginal portion of the cervix being obliterated, and the os being on a level with the top of the symphysis pubis. The sound passed the normal distance. In the pouch of Douglas was a firm, smooth, solid mass, equal in size to a man's fist, attached to the back of the cervix uteri, and growing downwards from it.

The tumour measured 10 inches in length, and when drained of most of its fluid weighed 6 pounds 11½ ounces. It filled the cavity of the pelvis, besides forming an abdominal tumour that reached to the ensiform cartilage. It sprang from the upper part of the posterior surface of the supravaginal portion of the cervix, its attachment consisting of a transverse band of tissue just below the junction of body and cervix. The body of the uterus was of normal size, and, with its appendages, which were healthy, lay in front of the tumour. The portion of the growth that extended downwards was solid, and formed a cast of the pelvic cavity. The upper part of the tumour, connected with the lower part by a constricted portion, was much the larger of the two. On the anterior and upper surfaces there was a number of thin-walled cysts containing serous fluid mixed with blood. The cysts varied in size from that of a hazel-nut to that of a hen's egg. On section of the mass, cysts were found in the deeper portions of the tumour, but these were fewer in number, and of smaller size, than those near the surface.

The specimen was shown to the Obstetrical Society of London at a meeting held on January 1, 1896, and is recorded in the society's *Transactions*, vol. xxxviii., 1896, p. 8. The operation in this case unfortunately proved fatal.

Case 4.—The patient, E. B., was a chorus-singer, aged thirty-six, and was married but had never been pregnant. She was admitted into St. Thomas's Hospital August 1, 1896, on account of an abdominal swelling first noticed four or five years ago. She complained also of frequency of micturition. There was a large rounded mass, rendering the abdomen prominent, and extending 2 inches above the umbilicus. It was hard and movable and gave no evidence of the presence of fluid. It could be felt on vaginal examination as a hard, rounded mass depressing the anterior vaginal wall, and only movable with the uterus. The canal of the uterus, 3¾ inches long, lay behind the main mass and somewhat to the right.

The tumour, after removal, was shown to have a capsule of uterine tissue varying in thickness from ¼ to ½ inch. On incising this, the tumour itself proved to consist of an outer layer, about 1½ inches in thickness, of firm fibro-myomatous growth surrounding a central cavity containing a straw-coloured fluid. The walls were extremely irregular, and presented a number of pits. Projecting bridles of softened myomatous tissue extended across the cavity in various parts. Adherent to the wall in parts were soft masses of growth which had taken on a myxomatous character. The cavity measured about 4 inches by 3 inches, and contained about ½ pint of fluid.

The patient died suddenly of pulmonary embolism on the nineteenth day.

Case 5.—C. McI., aged forty-six, single, the matron of a provincial hospital, was admitted into St. Thomas's Hospital April 4, 1899. She had known of a swelling for seven or eight years, and had had menorrhagia

for the last three years. A week before Christmas she had a fall. This was followed by an attack of phlebitis and lymphangitis in the right leg. On January 2, 1899, she had a rigor, and was delirious for a fortnight. Her life was at that time despaired of. As soon as was practicable after she had recovered from that illness, she came up to London for operation if that were thought feasible.

The abdomen was rendered prominent by two more or less rounded swellings. The lower of these was solid and not very movable. It was situated almost centrally, and reached from the pubes to an inch above the umbilicus. The upper was less prominent, more movable, and of softer consistence. It appeared to be capable of a certain amount of movement independent of the lower tumour, with which it was in contact. It extended to within an inch of the right costal margin, and from the nipple line on the right to 2 inches beyond the middle line on the left. The cervix was very high up. The sound passed easily $5\frac{1}{2}$ inches to the right of the lower tumour. It was influenced by the slightest movement of the upper tumour. The anterior vaginal wall was depressed by the lower tumour, but no part of either tumour occupied the true pelvis. The veins of the right leg and the inner side of the right thigh were prominent, enlarged, and tortuous.

The patient had lost about a stone in weight. She had now no pain, but it was obvious that she was unfit, in her present condition, to resume the duties of her appointment. The lower tumour was obviously a uterine fibro-myoma. With regard to the upper, there was some difference of opinion. The surgeons who had had charge of her in the country were inclined to think it was ovarian; so were some of my colleagues at St. Thomas's. Dr. Sinclair of Manchester, who had been consulted, had, on the other hand, expressed the opinion that both tumours were fibro-myomata, and with this view, after careful examination with the sound, I was disposed to agree.

The lower tumour proved to be a hard fibro-myoma $5\frac{1}{2}$ inches by 5 inches, growing from the anterior and lower part of the uterus. The softer tumour in the right hypochondrium measured 6 inches by $4\frac{1}{2}$ inches, and consisted of part of the body of the uterus itself, containing in its upper and back part an interstitial fibro-myoma undergoing softening and showing on section small cystic spaces about the size of a hazel-nut. A good deal of mucoid fluid escaped from the cut surface. The portion of uterus between the two tumours acted as a kind of pedicle to the upper one. The ovaries were both healthy.

The patient made a good recovery, and on November 24, 1901, wrote that she was feeling as well and as active as when she was twenty.

Case 6.—This case acquires a special interest from the patient being only twenty-three years of age. She was unmarried. Her operation took place on February 22, 1900. The abdomen had been noticed to be enlarged for about two years, and for about the same period there had been a sensation of weight in the pelvis, with inability to work and move about like other people. On one occasion, about six months before admission, she had had retention of urine. She had been liable for some time to slight irregular intermenstrual hæmorrhages, and for the last three months the discharge had been almost continuous. There was a solid immovable tumour in the lower part of the abdomen, measuring 5 inches by 6 inches, and reaching from the pubes nearly to the umbilicus. A portion of the tumour projected into Douglas's pouch, forming a swelling that encroached on the vagina. The os uteri was high up in front, above the summit of the symphysis pubis. The uterine sound passed upwards and forwards $2\frac{1}{2}$ inches.

The swelling was evidently either a uterine fibro-myoma or a solid tumour of the ovary. The youth of the patient, and the fact of the sound

passing the normal distance and forwards, seemed to make the latter the more probable.

The tumour proved to be an interstitial fibro-myoma, 5 inches by $5\frac{1}{4}$ inches, developed in the fundus of a retroflexed uterus. The cervix was put on the stretch and elongated to such an extent that its canal measured exactly $2\frac{1}{2}$ inches. When the tumour was lifted out of the pelvis, what had been the lowest and most dependent part became the uppermost. Its structure was that of an ordinary fibro-myoma, which was in several places undergoing cystic, and in one place calcareous, changes. The ovaries were both healthy. The patient recovered.

The specimen was exhibited at the Obstetrical Society, and was recorded in the *Transactions*, vol. xlii., 1900, p. 132.

Case 7.—The last case of the 'cystic' series was that of a patient with a pedunculated subperitoneal fibro-myoma, which had become cystic and inflamed, and was removed without the uterus.

The patient, E. R., a married woman, aged thirty-nine, was admitted to St. Thomas's Hospital March 13, 1900. She had been conscious of some abdominal fulness, and had suffered from dysmenorrhœa for about two years, but it was only during the last three months that the enlargement had increased rapidly. For a month before her admission she had had an almost constant stabbing pain, which she referred to the left iliac and umbilical regions. Lying down seemed to make the pain worse.

The abdomen was greatly distended. No fluid thrill was obtainable, and no defined tumour could be made out. But there was tenderness, with dulness on percussion and a sense of resistance, in the left flank and the left lumbar region, extending across the front of the abdomen to 2 inches beyond—*i.e.*, to the right of—the middle line, at the level of the umbilicus, and a little further than this lower down. Vaginal examination showed a large cystocele to be present. Bimanually, the abdominal tumour could be fairly well defined. When the prolapsed vagina was reduced, the much elongated cervix uteri could be felt in the sacral hollow, drawn out like a long finger.

The case was thought to be a multilocular ovarian cyst, with probable rupture of one of the loculi.

In consequence of an attack of bronchitis, operative treatment was deferred until April 5.

On being exposed to view, the tumour presented so dark an appearance as immediately to suggest a twisted pedicle. Nothing of the kind, however, was found. The tumour, on being brought outside the abdomen, was seen to be attached by a broad pedicle to the left side of the uterus. Over the pedicle were lying a number of dilated and tortuous veins, presenting a very remarkable appearance. During the operation a cyst at the back of the tumour was accidentally ruptured, and a quantity of thick green fluid, mixed with a good deal of flaky material, escaped. After removal the tumour measured 8 inches by $6\frac{1}{2}$ inches by $3\frac{1}{2}$ inches. On its external surface were several small cysts containing clear fluid. The area of attachment measured 4 inches by $2\frac{3}{4}$ inches. On the upper surface of the tumour was a small subperitoneal fibroid, which was full of soft, yellowish material. One part—the anterior—of the pedicle showed the ordinary structure of fibro-myoma; the posterior part was œdematous. On the posterior aspect of the tumour was a large ruptured cavity, which must have contained 4 or 5 pints of fluid. The wall of the tumour at this part was covered externally with inflammatory lymph. The wall of the cavity was lined with inflammatory lymph and broken-down tissue. The rest of the tumour was cystic and œdematous. Its weight was 3 pounds 9 ounces.

The patient became dangerously ill from chest complications after the operation, but eventually recovered, and was discharged well on May 12.

The heading 'Calcareous' needs no explanation. The change in the case tabulated was peripheral only. In two other instances the tumours exhibited a *partial* change of a similar kind. One of them is classed under the heading of 'Cystic' (Case 6), and the other under that of 'Necrotic' (Case 17).

The tumours classed under the heading 'Necrotic' are divided into (1) those which from some cause have lost their vitality and become simple masses of dead tissue — 'necrobiotic,' as many authorities term them; and (2) those which have not only become necrosed, but infected. Obstetricians will realize that the difference is much the same as that between a macerated and a putrid fœtus. As the number of necrotic tumours constitutes a larger proportion than would generally be expected, and as these cases are of exceptional interest and importance, I purpose giving a brief summary of the main clinical and pathological facts of each case. When the full record of a case has already been published, the fact will be indicated and the reference given.

Case 8.—E. T., aged forty-five, married, and the mother of three children, was admitted into St. Thomas's Hospital September 8, 1893. Her present illness began eight years previously, with pain in the abdomen, difficulty in bending forwards, and menorrhagia. Four years later she attended the out-patient department of a hospital, and was told she had a tumour and required operation. For the last three weeks she had had constant and fairly profuse hæmorrhage.

There was an abdominal swelling reaching 2 inches above the umbilicus. The tumour caused considerable prominence, was rounded, centrally situated, elastic, and movable from side to side.

The tumour was removed along with the body of the uterus. It was found to be a large intramural fibro-myoma, situated in the anterior wall. On section, it was shown to have undergone necrotic change, there being a large soft œdematous portion, the size of a man's fist, in its interior. The process spread from this focus in radiating lines. One branch, larger than the rest, on reaching the surface at the right cornu, measured 2 inches by $2\frac{1}{2}$ inches. (It was at this spot that the patient had complained of most pain and tenderness, and the omentum was found adherent over it.) The tumour, after enucleation, weighed 5 pounds 6 ounces. The necrotic patch had no ill-odour.

The patient recovered. (See *St. Thomas's Hospital Reports*, vol. xxii., p. 560.)

The following case is exceptionally interesting from the age of the patient, and from the evidence it affords that fibro-myomata 'do not invariably cease to be a source of danger to life even long after the menopause':

Case 9.—E. F., aged sixty-one, a widow, was admitted into St. Thomas's Hospital September 20, 1894, on account of an abdominal enlargement of the size, and somewhat of the shape, of a pregnant uterus at term. She had been told in 1875 that she had a tumour of the size of

a cocoanut. The menopause occurred at fifty, and there had been no hæmorrhage since, but the tumour had, according to the patient's account, continued to grow. For the last nine months it had increased in size rapidly. There had been difficulty of micturition during the last two years. The patient had for some time been suffering great pain in and around the tumour, and for the last three weeks had been very ill, with persistent vomiting, loss of appetite, and rapid emaciation.

The main tumour was wholly interstitial. On section after removal, it was seen to be of a grayish-yellow colour, and it emitted an odour like stale fish. In its interior was a large irregular cavity with ragged walls, containing offensive fluid mixed with necrotic tissue. There was a group of smaller tumours, apparently of cervical origin, filling the pelvis. These were enucleated; they showed no evidence of secondary change. The tumours weighed 24½ pounds.

The patient, unfortunately, developed septic symptoms, and died on the fifth day.

The specimen was exhibited at the Obstetrical Society of London (see *Transactions of the Obstetrical Society*, vol. xxxvi., p. 268), and a full record of the case was published in the *St. Thomas's Hospital Reports*, vol. xxiii., p. 474.

The next case is an instance of necrotic change (without sepsis) occurring in a small tumour situated where there was no risk of injurious pressure, the patient being a comparatively young woman. The case also illustrates the significance of pain as a symptom in fibro-myomata:

Case 10.—M. L., aged twenty-nine, a single woman, who had been suffering for about two and a half years from frequent attacks of abdominal pain and from increasing menorrhagia, was admitted into St. Thomas's Hospital October 12, 1895. She had been incapacitated for her work as a nurse for several months, and about six months ago the pain had been so severe as to necessitate confinement to bed for ten days. There was a well-defined, rounded, soft, brawny swelling, equal in size to that of an ordinary orange, above the pubes and a little to the right, inseparable from the uterus, the canal of which, somewhat elongated, lay behind it. The patient had no increase of temperature or other sign of fever.

The diagnosis lay between an adherent dermoid of the right ovary and a uterine fibro-myoma.

The tumour proved to be uterine. It projected from both outer and inner surfaces of the anterior wall, and was 2¾ inches in diameter. On section, the central portions of the tumour were found to be soft and diffluent. The softening was not uniform, but occurred in patches. On removing the pultaceous material, the cavities were seen to have ragged and extremely irregular walls. There was no ill-odour, and the surrounding uterine tissue appeared healthy. The ovaries were normal.

The patient made a good recovery, and four and a half years afterwards reported herself to be in good health.

The specimen was exhibited at the Obstetrical Society, and was described in the *Transactions*, vol. xxxvii., p. 284.

Case 11.—This case was complicated by pregnancy.

M. A. S., aged forty, the wife of a publican, residing in South Wales, was admitted into St. Thomas's Hospital October 1, 1895. She had had four children, the last twelve years ago. She had not menstruated since May. In August she began to suffer from pains which made her apprehensive of a miscarriage. These had continued more or less ever since.

Movements were first felt about the third week in August. She had had œdema of the feet and ankles since June. There was no albuminuria.

The abdomen was rendered prominent by a large lobulated tumour rising 2 inches above the level of the umbilicus. The pregnant portion of the uterus appeared to be on the left side, where movements could be felt. A portion of the tumour filled the posterior part of the pelvic cavity, depressing the vaginal roof. The cervix was obliterated, its lips being on a level with the summit of the symphysis pubis. Two fingers could be passed between the pelvic portion of the tumour and the pubic bones.

The parts removed consisted of the pregnant uterus, with a number of fibro-myomata. In front, and also behind and to the right, were several subperitoneal fibro-myomata, some pedunculated, others sessile. Projecting from the lower and posterior surface was a large and fairly firm outgrowth, covered, for the most part, by peritoneum, and filling the greater part of the pelvic cavity. Its diameters were $3\frac{1}{2}$ inches by $3\frac{1}{2}$ inches by $2\frac{3}{4}$ inches. On section, it presented a pink colour in the centre, with a zone yellowish white in colour outside it, and numerous spaces containing fluid. It was evidently undergoing necrotic change. On laying open the uterine cavity, a female fœtus was found 10 inches in length. The placenta was 4 inches in diameter.

The patient died of exhaustion in forty-eight hours.

For full report see *St. Thomas's Hospital Reports*, vol. xxiv., 1895, p. 472.

Case 12.—A fibro-myoma of the right broad ligament.

L. R., aged fifty-six, single, a mantle-cutter, residing at Balham, was admitted into St. Thomas's Hospital October 10, 1896, on account of a large abdominal tumour, first noticed twelve months ago. The menopause had occurred about nine years previously. She had had nausea and vomiting for some months, and for the last six months had had much abdominal pain. Micturition was frequent and defæcation painful. The tumour was of irregular outline and unequal consistence, reaching nearly to the ribs on each side, and filling the pelvic cavity. The os uteri was very high. There was no projection of cervix, the os being represented by a mere dimple in the vaginal roof.

After removal, the tumour resembled in size and shape the pregnant uterus at full term. It measured $12\frac{1}{2}$ inches in length, $10\frac{1}{2}$ inches in width, and 8 inches in depth. Its weight was 17 pounds 5 ounces It was adherent to the back of the uterus and right broad ligament, to intestine and to omentum. The right Fallopian tube was stretched over it. It had no true pedicle. It was adherent to, but was otherwise independent of, the uterus, which was not removed.

On section, a large quantity ($7\frac{1}{2}$ pints) of dark-coloured fluid, like porter, escaped. The cavity was large and irregular, and its wall of unequal thickness. A mass of broken-down, liquefying tissue was seen in its interior. The microscope showed the tumour to be a fibro-myoma.

The patient died on the seventeenth day. The autopsy showed thrombosis of the left axillary vein.

It was not suspected, in the following case, that the tumour had undergone any serious change, or that its surface had been acutely inflamed:

Case 13.—Mrs. H., aged thirty-eight, who had been married thirteen years, but had never been pregnant, and had been a widow for twelve months, was admitted into a private nursing-home on October 2, 1897, to

be operated upon for the removal of a fibro-myomatous uterus. She had known of there being a tumour for about two years, and its size now occasioned great inconvenience and disfigurement.

There was a firm, apparently solid, abdominal tumour about equal in size to a seven-months' pregnant uterus. In Douglas's pouch was a mass of lobulated outgrowths of the size of the fist. The cervix was small, and high up above the symphysis pubis.

A considerable quantity of dark turbid fluid was found in the peritoneal cavity, due to an apparently recent rupture of a cyst in the upper part of the tumour. There were extensive and intimate adhesions, especially to the bladder in front and to the omentum above. The uterus was embedded in a cluster of subperitoneal sessile fibro-myomata, filling up the pelvis, and surrounded by adhesions.

The main tumour, after removal, measured $7\frac{1}{2}$ inches by $4\frac{3}{4}$ inches by 4 inches. The upper part was converted into an irregular ragged pseudo-cyst the size of a cocoanut, lined by necrotic but inodorous tissue. The contents had escaped through a rent in the upper border, where the wall was extremely thin. The body of the uterus, itself not much enlarged, was embedded amongst a number of subperitoneal fibro-myomata. Three others were removed from Douglas's pouch, the largest the size of a large kidney, the other two smaller. They were pedunculated and adherent.

The tumours removed weighed altogether about 5 pounds.

The patient recovered, and has since been married.

Case 14.—A. M., aged thirty-four, single, a cook, was admitted into St. Thomas's Hospital September 25, 1897. Her first serious symptoms had commenced twelve months before, when, on rising from bed, she had a sudden attack of abdominal pain, accompanied by faintness. From that time she had recurrent attacks of pain in the left side, menorrhagia, and an intermenstrual discharge of a yellow colour. There was increasing weakness, so that she had been obliged in the preceding June to give up her regular work. Early in July she had retention of urine, and noticed a swelling in the lower part of the abdomen, which had gradually increased in size from that time.

She was thin and sallow, and looked pale and ill. Her temperature was 99·6°. She had a lobulated irregular tumour in the lower part of the abdomen. The length of the uterine canal was 6 inches.

The mass, after removal, measured $5\frac{3}{4}$ inches by $5\frac{1}{2}$ inches by $3\frac{3}{4}$ inches, and consisted of the body of the uterus much hypertrophied and containing a number of interstitial fibro-myomata. Two of these were larger than the rest—one at the fundus $2\frac{1}{2}$ inches by 2 inches, which had become softened from œdema, the other at the lower part of the anterior wall $3\frac{1}{2}$ inches by $3\frac{1}{2}$ inches, which presented necrotic changes. On section, it had a bluish-pink appearance, and it emitted a peculiar and disagreeable odour, like that of stale fish. There were no evidences of breaking down. The smaller tumours were ordinary hard fibro-myomata.

The specimen was exhibited at the Obstetrical Society, and will be found described in its *Transactions*, vol. xxxix., p. 281.

The patient recovered, and two and a half years later reported herself quite well.

Case 15.—M. P., aged twenty-seven, single, a cook, residing at Alnwick, was admitted into St. Thomas's Hospital February 15, 1899. About three weeks previously, when at the end of a menstrual period, she was seized with pains in the hypogastric and right iliac regions, shooting down the legs. These pains became worse, and she was obliged to go to bed and send for a doctor. A week later she had retention of urine, and the catheter was required. After this an examination was made, and, a tumour being discovered, she was sent into hospital. There had been no menstrual irregularity of importance.

There was a globular, well-defined tumour, smooth, hard, and immovable, rising from the pubes to within 2½ inches from the umbilicus. There was no tenderness or evidence of fluctuation. The uterine canal was of normal length, and lay behind the mass and to the extreme right of it. The mass could not be separated from the uterus; it gave the impression of being equal in size to a fœtal head at term.

The tumour proved to be an interstitial fibro-myoma in the anterior wall of the uterus. On section, it was found to be about the size of a Jaffa orange, soft, and of a dark-red colour. It had a distinctly fishy odour. It had uterine tissue all around it ¾ inch in thickness.

The patient recovered.

The specimen is preserved in St. Thomas's Hospital Museum (No. 2,435 D), and the case is fully recorded in the *St. Thomas's Hospital Reports*, vol. xxviii., 1899, p. 271.

Case 16.—A. C., aged thirty-seven, single, a straw-hat maker, residing at Luton, was admitted into St. Thomas's Hospital April 29, 1899. The abdomen was known to have been enlarged for six years. Menstruation had never been excessive. Nine weeks before admission she had an attack of shivering, with headache, followed two days later by severe pain in the left side of the abdomen, which lasted five weeks and then suddenly ceased. She had been confined to bed during the whole of the nine weeks. She had lost her appetite and had become much thinner.

She was a thin, pale woman, and looked ill. There was a tense elastic swelling, with a distinct fluid thrill, distending the entire abdomen. Just above the pubes a smaller tumour of firmer consistence could be felt, connected with the larger swelling and moving with it. Some small, round masses and a small, movable tumour, the size of a Tangerine orange, were felt *per vaginam* behind the uterus. No part of the abdominal tumour projected into the pelvis, but its lowermost part rested on and depressed the anterior vaginal wall. No evidence of fluctuation could be obtained in the lower portion.

The tumour was an adherent fibro-myoma arising from the anterior wall of the uterus. Its wall was ruptured during the separation of adhesions, and 4 pints of inodorous puriform fluid escaped. The main tumour consisted of a lower solid portion and an upper cystic portion. The hard portion, on section, showed the ordinary structure of a fibro-myoma. The upper cystic part was covered externally with tags of adhesion, and its wall had been torn in several places during removal. Its wall was very variable in thickness. Here and there it consisted of little more than the peritoneal covering. Elsewhere much of the fibro-myomatous tissue remained, projecting irregularly into the central cavity. Besides the puriform fluid, the cavity contained flakes of broken down necrotic tissue.

The patient recovered, and a year later reported herself in very good condition.

The case will be found fully reported in the *St. Thomas's Hospital Reports*, vol. xxviii., 1899, p. 277.

The following case illustrated several varieties of degenerative change, one tumour showing fatty and calcareous changes and another being necrotic.

Case 17.—J. S., aged thirty-seven, married, and the mother of one child, was admitted into St. Thomas's Hospital June 21, 1899. For eight years she had noticed an enlargement, and three and a half years ago she had begun to suffer from menorrhagia (the hæmorrhage being occasionally very severe) and from increasing dysmenorrhœa. She was

quite incapacitated for work, and for three weeks before admission had been confined to bed.

There was a smooth, firm, solid, slightly movable tumour in the abdomen, extending from the pubes to a finger's breadth above the umbilicus. The lower end of the tumour rested on the outer vaginal wall and depressed it. The uterine canal lay to the left. The lower end of the tumour appeared to be continuous with the front of the uterus. No part of it could be felt *per vaginam* behind the cervix or in the lateral parts of the pelvis. The bladder lay chiefly in front of it.

After removal, two fibro-myomata were found in the anterior wall of the uterus and one in the posterior. The uterine canal was $3\frac{1}{2}$ inches in length; its mucous membrane was quite healthy. The lower and larger of the two anterior tumours measured 3 inches by 3 inches, and was softened from fatty degeneration. On section, it was seen to be of a greenish-yellow colour. Its surface felt greasy, and its margin, which was well-defined, was gritty with calcareous change. The upper of the anterior tumours was smaller, and had the structure and consistence of an ordinary hard fibroid.

The tumour in the posterior wall measured $4\frac{1}{4}$ inches by $3\frac{3}{4}$ inches, and on section showed the appearance of bruised muscular tissue. It had a thin layer of uterine tissue around it. It was soft, pulpy, and œdematous, and so deeply blood-stained that it had a dark, purplish-red colour. This was thought to show that it had undergone necrotic change, a view which the microscope confirmed.

The patient made a very satisfactory recovery, and eight months after her operation reported herself as quite well.

The case is fully recorded in the *St. Thomas's Hospital Reports*, vol. xxviii., 1899, p. 273.

Case 18.—E. M., aged forty-one, married, residing at Southampton, was admitted into St. Thomas's Hospital October 28, 1899.

She had been under medical treatment for the previous ten months, on account of irregular hæmorrhages, an offensive vaginal discharge, difficult and painful micturition, and a sensation of bearing down that interfered with her movements. She had first noticed a lump about five months before admission. About three weeks ago she had had a serious hæmorrhage.

There was a hypogastric tumour, causing some prominence, and reaching 5 inches above the pubes. The sound passed 4 inches. No part of the tumour was intrapelvic.

After removal, the tumour, which was in the posterior wall of the uterus, was seen to be interstitial. No part of it projected into the cavity. The tumour was encapsuled and easily enucleated. It measured $4\frac{1}{4}$ inches by 4 inches by $3\frac{1}{2}$ inches. On section, its cut surface was of a dark, livid hue, somewhat like that of a raw beef-steak. It gave off a faint, fish-like smell, not offensive.

There was a hydrosalpinx on the left side, otherwise the uterine appendages were normal.

The patient died on the fifth day of septic peritonitis. The uterine stump was healthy. There was an early condition of granular contractive kidney.

Case 19.—M. M. B., aged forty-four, married, and the mother of one child, was admitted into St. Thomas's Hospital September 18, 1899.

She had been told, eight years previously, that she had a uterine tumour, but she herself had only noticed a swelling for six months. Since then it had increased rapidly in size. When she found herself losing appetite and weight and beginning to be troubled with sickness, she sought advice. She had had no pain or menorrhagia.

She was very pale and thin and looked ill. The abdomen was

distended by a large tumour, reaching from the pubes to within 1½ inches of the ensiform cartilage. The tumour was divided by a sulcus into two parts—a small, movable, hard, nodular portion below, and a large, tense, fixed, fluctuating tumour above. The vagina was encroached upon by a many-lobed solid growth, pressing down the right fornix and the anterior vaginal wall. The lobulated supra-pubic tumour was connected with, or was a part of, this growth. The cervix was high up.

An extensively adherent pedunculated, sub-peritoneal fibro-myoma, 10 pounds 12½ ounces in weight, was removed by operation. On section, the tumour was found to have become broken down in its interior, and to contain, within a cyst-like cavity, with rough, irregular walls of variable thickness (2 inches to ⅛ inch), 4 pints and 7 fluid ounces of dark, blood-stained fluid, mixed with blood-clot and much broken-down tissue.

The patient's condition prevented anything further being done, even if it had been practicable or desirable.

Death took place on the fifth day, after persistent vomiting. There was no evidence of general peritonitis or of intestinal obstruction. The pelvis was filled with a mass of uterine fibro-myomata, interstitial and subperitoneal, which were seen on section to be undergoing central softening.

The case will be found fully recorded in the *St. Thomas's Hospital Reports*, vol. xxviii., 1899, p. 278.

Case 20.—E. F., aged forty-six, single, a lady's-maid and confidential servant, was operated upon in a private nursing home on January 3, 1900.

The patient had been seen by Mr. Knowsley Thornton ten years previously, when the tumour was comparatively small. He is reported to have then said that the disease would never imperil her life, and that it could not be operated upon. The enlargement had since increased, so that the patient had become largely incapacitated and her abdomen enormously distended; but, fortified by the result of her interview with Mr. Thornton, she had persistently declined to see any other doctor. Quite recently, however, she had been induced to consult another gynæcologist, who, finding her with a large multilocular cystic tumour, had pronounced the tumour ovarian.

The patient was alarmingly emaciated. She had been recently subject to attacks of collapse. The maximum girth was 44⅝ inches. The attenuated abdominal wall closely followed the various prominences and sulci of the growth, and large veins were visible on the surface. The uterus was found high up, the cervix in the right fornix, the canal of normal length.

The tumour, on being exposed, was seen to consist of a number of large, smooth, thin-walled, cystic lobes, with deep intervening sulci. The uterus was enlarged. It lay entirely above the pelvic brim, and was closely incorporated with the tumour, forming part of the anterior wall of its largest lobe. The left cornu was drawn up, the right down, so that the uterus lay obliquely. Lying above the fundus and crossing the tumour in front was a thick, whitish, œdematous, oblong body, in shape and appearance resembling a large pancreas, passing from the left cornu of the uterus upwards and towards the right. This proved to be the enlarged and displaced left ovary. The right ovary, also much enlarged, lay concealed deeply down to the right of the tumour. There was nothing resembling a neck or pedicle. The tumour had lifted the peritoneum completely out of the pelvis, extending under and obliterating the left broad ligament, and, to a less extent, the right. The stripping up of parietal and visceral peritoneum had extended beyond the limits of the pelvis high up into the abdomen, especially on the left side, where the sigmoid flexure of the colon was seen displaced and lying on one of the lobes. One large spleen-shaped lobe on the left side suggested an

enlarged and displaced kidney. The kidney, however, was discovered in its normal situation. The hand could be passed a considerable distance around and beneath the tumour on the right side, but on the left the peritoneum was reflected directly off the growth on to the posterior and lateral abdominal walls, showing the greater part of the mass to be retro-peritoneal.

The whole interior of the enormous growth was excavated into a cavity with ragged walls and irregular recesses, containing a large bucketful of dark, mucoid fluid and débris, free from ill-odour. The tumour and contents weighed 34½ pounds. A portion was sent for microscopical examination to the Clinical Research Association, and the following report, signed by Mr. Targett, was received in due course: "There is no malignant growth in this specimen. It consists of a fibroid of the uterus which has undergone extensive hyaline and cystic degeneration, so that the muscle substance will not stain with nuclear dyes.' The operation was undertaken, of course, only as a forlorn hope, and the patient, unfortunately, did not survive it.

Case 21.—A. M., aged thirty-five, a married woman, residing at Bishop's Stortford, was admitted into St. Thomas's Hospital April 10, 1901. She had been married five years, but had never been pregnant. She had had some irregular and profuse uterine hæmorrhage in September, 1900. The menstrual periods in October and November were scanty, and menstruation then ceased. Since September, 1900, there had been difficulty of micturition, with frequent retention of urine (needing a catheter), and occasional incontinence. She had been first seen three weeks before her admission in the out-patient room, and was then advised to come inside for treatment. She did not at that time feel seriously ill, and therefore declined. But her health from that moment had begun to break down, and when, three weeks later, she consented to come in, her appearance had undergone a very striking alteration. She looked emaciated and ill, and was scarcely able to stand. She complained of pain in the back and down the legs, and for the last week had been constantly sick and quite unable to take food. The urine was acid, and had a specific gravity of 1010. It gave a blue colour with guaiacum and ozonic ether, and a precipitate of albumin on being boiled. This precipitate, on standing, amounted to nearly half the bulk of urine.

There was a solid, irregular, centrally-situated tumour, harder in one part than another, rising out of the pelvis and reaching to within two fingers' breadth of the umbilicus. The tumour extended downwards into the pelvis, displacing the cervix forwards and depressing the vaginal vault.

On laying the abdomen open to view, the uterus was seen lying in front and to the left of the tumour, rotated on its longitudinal axis, so that its right lateral border was directed forwards. The tumour was with difficulty raised out of the pelvis. It proved to be a fibro-myoma of the posterior wall, measuring 7 inches by 6 inches by 6 inches. On section, it was found to be soft and œdematous, with an odour of stale meat. Its cut surface had a deep reddish-purple, mottled appearance. A section was sent to the clinical laboratory of the hospital for examination, and the report thereupon was as follows: 'Nuclei stain faintly with logwood throughout. Tissue probably in a state of early necrosis. Vessels much congested.' The uterine canal measured 4¼ inches in length, and the uterine wall measured ⅜ inch in thickness. The endometrium and the uterine appendages were healthy. The latter were not removed.

The patient died six days after operation with symptoms of uræmia.

Both ureters were found dilated, evidently from intrapelvic pressure. The kidneys showed a moderate degree of hydronephrosis; the pelves and infundibula were uniformly dilated to at least twice the normal size.

The mucous membrane was injected. The parenchyma of the kidneys was uniformly swollen; it presented many pale-yellow, irregularly-shaped areas, which were judged to be areas of infective nephritis, leading to necrosis. None of them had broken down. The urinary bladder was much injected. Near the uterine stump a patch of the vesical mucous membrane, over an area 3 inches by $\frac{1}{8}$ inch, was apparently in a state of necrosis, and covered with phosphatic deposit. The ovaries and Fallopian tubes were normal.

CASE 22.—The last case of the simple, non-infected, necrotic series is interesting from the circumstance that the tumour (a subperitoneal fibro-myoma) had a twisted pedicle.

S. L., aged forty-five, married, and the mother of one child, was admitted into St. Thomas's Hospital August 27, 1901.

In November, 1900, she had been in the Ipswich Fever Hospital for three months for what was supposed to be an attack of fever. Whilst in the hospital she noticed for the first time that her abdomen was enlarged. The enlargement had continued ever since, and had of late increased rapidly. She had had occasional pain, but none of any consequence until the morning of August 15, when, on raising her head from the pillow to look at the child, who was in an adjacent cot and had suddenly begun to cry, she felt a sudden pain in the right iliac region, and had to lie down again. She made many attempts to get up that day, but each time the pain was so severe that she was obliged to remain where she was, and, as a matter of fact, was, in consequence of being unable to get up, without food until the husband's return from his work at eight in the evening. The pain remained very severe through the night. Next day it was somewhat easier. On the 17th, and again on the 19th, she was very sick, and vomited. These were the only occasions on which there was vomiting. On the 18th she tried to sit up, but could not, and she had to remain in bed up to the time of admission.

The last period had begun on August 22, and had lasted three or four days. The pain was worse during the period. The discharge was dark and thick and contained clots. There had been some offensive discharge from time to time during the past three months.

The middle and lower zones of the abdomen were occupied by a thick-walled, fluctuating, fixed tumour, extending 10 inches above the pubes and $3\frac{1}{2}$ inches above the umbilicus. Separated by a sulcus from the main mass, there was, on the left side, a smaller tumour lying internal to the iliac crest.

Per vaginam the cervix was fixed, and the os small and directed far back. The sound, after it had been acutely curved and the patient had been placed close to the foot of the table, passed $2\frac{1}{2}$ inches round towards the left. A quantity of ill-smelling, altered blood made its escape.

There was some difference of opinion as to the diagnosis. Some of my colleagues thought the tumour was a cystic fibro-myoma growing from the anterior wall of the uterus, and throwing that organ into a state of retro-version. My own view was rather in favour of its being a right-sided ovarian cyst, with twisting of its pedicle and twisting of the uterus as a sort of continuation of the pedicle.

When exposed to view, the tumour was seen to be dark in colour and covered with peritoneum. It was attached to the anterior and left border of the uterus by a long pedicle. There was a slight twist of the pedicle, and the uterus itself was so completely twisted that its anterior surface was directed backwards and towards the right. The tumour (owing to this rotation) lay to the right of the uterus, which constituted the separate small mass felt on the left side before operation. The uterine appendages of both sides were normal. The tumour was adherent to the anterior

abdominal wall, to omentum, and to some of the appendices epiploicæ. The adhesions to the latter were very vascular.

On section, the tumour proved to be a fibro-myoma, which had become broken down in its interior, so as to form a large cyst-like cavity, containing 3 pints 17 fluid ounces of puriform fluid without odour. The wall varied from $\frac{1}{3}$ inch to 2 inches in thickness; it consisted partly of fibro-myomatous tissue, and in about equal proportions of uterine muscular tissue and peritoneum. The outer wall presented bosses, one of which was thin walled and contained mucous fluid; others consisted of firm fibro-myomatous tissue. The inner wall was ragged and uneven with irregular recesses.

The pathological report states that (1) the cyst had no limiting layer or membrane, and that (2) the puriform fluid from its interior was sterile.

One or two ordinary, sessile, subperitoneal fibro-myomata were shelled out; the uterus itself was not removed.

The patient made an uninterrupted recovery.

I now come to the second division of the necrotic tumours, that, namely, in which, in addition to the necrosis, there was undoubted evidence of bacterial infection. The first case in this comparatively short series has a special and personal interest for me, as being the first instance in which I performed the operation of abdominal hysterectomy for fibro-myoma. Hitherto I had contented myself with treating such cases as needed operative relief by the removal of the uterine appendages. An exceptional case had occasionally presented itself for which that operation was unsuitable, and for which surgical relief was yet imperative. Such a case I had been in the habit of passing on to some operator who had had experience of the operation of hysterectomy. But, on the occasion in question, the urgent symptoms came on apparently as the result of accidental infection during an examination conducted in the hospital, and therefore, when it became evident that the patient's only chance was to have an abdominal hysterectomy, I performed that operation.

Case 23.—E. D., aged thirty, married seven years, butnever pregnant, was admitted into St. Thomas's Hospital December 21, 1891, with an abdominal tumour, which she had first noticed three months after her marriage. The tumour became tender and painful at the end of about twelve months, in consequence of which she went to a hospital, where she was examined, told the nature of her complaint, and advised to take no notice of it. During the next five years she remained in good health, and the size of the swelling did not perceptibly increase. Six months before admission, however, it began to grow rapidly, and to become tender and painful. There had been no interruption to menstruation, and no increase in the amount lost; in fact, the last three periods had been scanty in quantity. The patient now and then was sure she felt movements, and the idea that she was pregnant had frequently occurred to her.

The tumour was now firm, solid, elastic, and tender, extending from the pubic symphysis upwards to a distance of $13\frac{3}{4}$ inches. It was dull on percussion, and a distinct souffle, synchronous with the radial pulse, could be heard on auscultation over it. Vaginal examination showed the os and cervix uteri to be normal in size and direction. The sound passed easily and painlessly a distance of $6\frac{1}{2}$ inches. A blood-stained discharge followed the examination, and continued during the whole of the next day.

On the morning of the day but one after the examination, the temperature, which up to this time had not exceeded 100° F. in the evening, and had usually been normal in the morning, rose to 103°, and the patient had an attack of shivering. There was at this time no pain. At one in the afternoon there was free hæmorrhage, the blood being partly clotted. Two days later the discharge became extremely offensive, and there was a good deal of pain in the tumour itself and over the region of the sacrum. The patient now became extremely ill. The abdomen was exquisitely tender, and any movement of the tumour caused intense pain. The discharge was still blood-stained and offensive. The patient, though not a nervous or complaining woman, lay groaning night and day, and it became necessary to keep her under the influence of morphia. She was unable to take food, lost flesh rapidly, and became extremely weak. It was evident that she was suffering from septic absorption.

The operation of abdominal hysterectomy, having been willingly consented to, was performed January 8, 1892.

After removal, the tumour was seen to consist of a single interstitial fibro-myoma, surrounded by a layer of apparently healthy uterine tissue $\frac{1}{3}$ inch in thickness. The tumour measured 9 inches by 7 inches and weighed 8 pounds. There was nothing unusual in its external appearance, but it emitted, on section, an odour like that of stale fish. The cut surface was quite firm, and of a grayish, livid colour. The following is an extract from the report of the microscopical examination made by Dr. Wheaton:

'Sections were made and stained by Gram's method. The sections show that the tumour was a fibro-myoma containing a great many dilated lymphatic spaces. The cells of the tumour are swollen, opaque, and granular, and their nuclei indistinct. Contained within the lymphatic spaces are large masses of micrococci in the zoöglœa stage, embedded in a structureless material. Similar micrococci are also seen lying amongst the cells of the tumour, both in masses and scattered about singly. There is no evidence of malignant degeneration, or of hæmorrhage into the tumour, or of the presence in the neighbourhood of the micrococci of any small, round-celled infiltration such as would inevitably be seen in inflammation.'

The patient made an excellent recovery, and eight years later was perfectly well. The ovaries and tubes were healthy, and were not removed.

A drawing of the microscopic appearances will be found, along with a full account of the case, in a clinical lecture on the subject published in *International Clinics*, vol. iii., second series, 1892, p. 273.

The next case is that of a sloughing interstitial fibro-myoma in which the slough had ulcerated through the uterine wall into the peritoneal cavity, and had there infected the wall of the transverse colon, to which it was adherent, with the result of causing several intestinal perforations. The urgent symptoms followed a miscarriage,

and were probably due to septic infection of the tumour from septic metritis.

Case 24.—F. L., aged thirty-six, married six months, residing at New Swindon, was admitted into St. Thomas's Hospital February 7, 1895. The catamenia had appeared about fourteen days after her marriage in July, 1894, and then ceased. Nothing abnormal was noticed until the patient was a month or two advanced in pregnancy, when she was observed to be larger than she should be. On December 24, 1894, a miscarriage took place. The fœtus was judged to be of about four and a half months of gestation. The placenta had to be removed under an anæsthetic. A few days after the miscarriage the abdomen began to be painful and to increase rapidly in size. The patient had been ill and in bed ever since. She had been unable to take food, and had lost flesh rapidly. She was to have come to the hospital a fortnight earlier, but was considered too ill to travel.

On admission, she looked extremely ill. Her tongue was dry and red. Both legs were œdematous, and there were two bedsores, one on each side of the sacrum. There was a tense globular tumour centrally situated in the abdomen and distending it. The tumour was not movable. It extended from the pubes upwards, its vertical diameter being about 8 inches, and transverse about 7 inches.

The lower end of the tumour could be felt through the anterior vaginal wall, but no part of it lay in the pelvis. The tumour was found everywhere adherent, the adhesions to bowel and omentum being particularly firm. On exposing it to view, after separating the adhesions, it was found to be a large uterine fibro-myoma, with a large slough protruding on the left side. This slough had been in contact with the transverse colon, which now presented a large ulcerated patch $3\frac{1}{2}$ inches by $1\frac{1}{2}$ inches, from which the peritoneal coat was entirely denuded. This patch involved nearly half the circumference of the bowel. Several perforations were apparent, and fœcal matter was seen oozing through four apertures, the largest of which was about the size of a mustard-seed.

After removal, the tumour was found to be interstitial. It measured 7 inches by 6 inches by 5 inches. Its anterior surface was covered with fairly smooth serous membrane, with slight recent adhesions. The posterior surface presented a large protruding mass of sloughing growth, which had ulcerated through the uterine wall, the portion of the latter involved measuring $6\frac{1}{2}$ inches by $4\frac{1}{2}$ inches. The odour was extremely offensive. The lower end of the tumour was encapsuled, and presented externally a comparatively healthy appearance.

On section, the tumour had a pinkish colour, with an outer layer of greenish, sloughy material. Underneath this layer was a large number of honeycombed cavities containing stinking pus. Similar cavities were scattered throughout the tumour. The ovaries removed presented a normal appearance.

The patient only survived the operation for thirty hours.

The third and last case of this series was an example of the protrusion of a sloughing fibro-myoma, not from the peritoneal surface of the uterus, as in the preceding case, but into the uterine cavity, whence it was driven down into the cervical canal, and at the time of operation was being extruded through the os externum, simulating a sloughing polypus. The sloughing and presenting portion being merely the lower end of a large abdominal tumour

reaching (with the uterus) to the level of the umbilicus, an attempt to remove it *per vaginam* was only very partially successful, and it became necessary, two days later, to remove the whole tumour by abdominal hysterectomy.

Case 25.—F. M. B., aged thirty-eight, single, was admitted into a private nursing Home in May, 1897, with a view to the removal of what appeared to be a sloughing fibroid polypus of the uterus. The patient had been first sent to me by Mr. W. K. Treves, of Margate, in 1891, on account of excessive hæmorrhage from a uterine fibro-myoma, which she was then known to have had for at least two years. In July, 1893, Mr. Treves removed from the vagina, under circumstances of great difficulty, a very large sloughing fibroid polypus with broad uterine attachment. For six months the patient had no pain and no excessive loss; but in January, 1894, the menorrhagia recommenced, and in March the loss was alarmingly profuse. On April 9, 1894, I found the patient excessively blanched. The uterine tumour reached to within ½ inch of the umbilicus, the uterine canal measured 4 inches, and the os uteri was closed. I advised on that occasion exploration of the uterine cavity, followed by removal of the polypus if a polypus were found. If no polypus were found, I said that I thought the question of abdominal section (followed by oöphorectomy or hysterectomy, as the case might be) ought to be considered. This advice, however, was not acted upon. The patient continued for a year to have very profuse and painful menstruation; after that she improved in both these respects, as well as in general health. In April, 1897, after being better than usual for several months, she began to have a very offensive discharge. On examination, the os uteri was found to be considerably dilated, and a tumour was presenting itself. The patient was thereupon sent up to London, where I saw her on April 30, and arranged to operate. Accordingly, on May 8, the cervical canal was further dilated, and the tumour removed as far as was possible *per vaginam*. But after two and a half hours had been spent, and the sloughing portion of the growth had apparently all been removed, there still remained, out of reach, a large soft mass, so extensive as to suggest continuity with the abdominal tumour. The following day the temperature rose to 103°. Recognising the danger, I immediately proposed abdominal section as the patient's only chance of safety. The patient and her friends willingly consented, and on May 10 I performed abdominal hysterectomy.

The mass removed measured 7½ inches by 6 inches by 5 inches. The uterine wall was hypertrophied. Posteriorly, it was 1 inch in thickness; anteriorly, ½ inch to ⅓ inch. The tumour was soft and single; it projected into the greatly dilated uterine cavity from the whole of its anterior and lateral walls, and its lower end projected downwards below the level of the os internum for about 1 inch. This part, which had occupied the dilated canal of the cervix, was purple and malodorous. There were one or two commencing cystic dilatations in the centre of the tumour, but there was no marked general œdema.

The patient recovered (not, however, without some localized suppuration), and eighteen months later reported herself quite well.

Having thus considered, in some detail, the condition of the tumours, the next point for inquiry is the complications that were met with. I purpose to include only those complications which may reasonably be supposed to be directly caused by the tumours; others, such as ovarian cysts, etc., are omitted, as being beyond the

scope of the present investigation, and as having no practical bearing on the questions to be elucidated. Limiting, then, the list in the manner indicated, the following complications were observed:

Serious peritonitic adhesions	in 12 cases.
Hydrosalpinx	in 5 ,,
Dilated ureters and hydronephrosis ...	in 1 case.
Dilated ureters, hydronephrosis, suppurative pyelitis in both kidneys, with two phosphatic calculi and numerous abscesses in right kidney	in 1 ,,
Ectopic gestation	in 1 ,,
Twisted pedicle	in 2 cases.

Amongst the twelve cases in which there were serious peritonitic adhesions, there were four in which the tumour was necrotic (Cases 13, 16, 19, and 22), and one in which it was necrotic and septic (Case 24). Of the seven remaining cases, one was complicated by hydrosalpinx, and in two the tumour was œdematous. In only two cases was there discovered any condition other than the uterine tumour which might have caused the peritonitis. One was a case in which, in addition to œdema and incarceration of the tumour, there was miliary tubercle of the peritoneum with ascites. The other was a case of myomectomy, in which there was a history of recurrent attacks of pelvic peritonitis, and in which both ovaries were found cystic and inflamed.*

Of the five cases in which hydrosalpinx was observed, two were associated with serious peritonitic adhesions and œdema of the tumour, and one with a necrotic condition of the tumour (Case 18). In one of the former cases there was, in addition, miliary tubercle of the peritoneum with ascites.

The number of cases in which the tumour is known to have injured the patient from pressure on the ureters is smaller than might have been expected. The first of the two cases mentioned in the list has already been related (Case 21); the other is sufficiently interesting to merit a short abstract:

Case 26.—E. M., aged forty-three, married, residing in Lambeth, was admitted into St. Thomas's Hospital May 5, 1894. She was too

* For reasons given in the earlier part of this paper, most of those cases are excluded from this analysis in which the operation was not carried further than an exploratory incision. Had it been otherwise, the number of cases in which there were serious peritonitic adhesions would have been larger, for in four instances it was the presence of such adhesions that prevented the completion of the operation. In these four cases the cause of the adhesions remains, of course, undetermined.

ill to answer questions, and her history is, in consequence, imperfect. It was, however, ascertained that she had been married twice, and had borne two children, the younger twenty-one years ago. Except that menstruation had ceased two years previously, she had noticed nothing amiss with her health until a week before admission, when she was suddenly seized with severe pain on the left side of the abdomen. There was difficulty in micturition, and the urine dribbled away in small quantities. She once tried to get up, but had to return to bed, and had remained there up to her admission. No doctor had been called in until the day she was admitted. When the doctor came, he passed a catheter, drew off a quantity of urine, and advised her to go to a hospital. On admission, the tongue was dry, the lips were dry and brown, the pulse was quick, and the temperature was normal. The respirations were rapid and feeble, and twitchings of the fingers were observed. The abdomen was slightly distended, with some resistance on the left side. On vaginal examination, a fixed, solid mass was felt behind the cervix. The urine was alkaline and offensive, and contained albumin and some muco-pus.

The abdomen was opened on the following day. A hard mass, inseparable from the cervix and quite immovable, lay in the pelvis behind and to the left of the uterus. It was found impossible to dislodge it. The bladder was found distended. A catheter was therefore passed, and 1 pint of offensive urine was drawn off. In consequence of the immobility of the pelvic tumour, and the serious condition of the patient, nothing more was done, and the abdomen was closed. She became very restless, and died at 11.15 the following evening.

At the autopsy the mass was found to be a fibro-myoma of the uterus, $3\frac{1}{2}$ inches in diameter, incarcerated in the pelvis and immovable. The ureters were dilated together with the pelvis of both kidneys, and contained puriform fluid. In the right kidney were two phosphatic calculi and a number of subcapsular abscesses.

The case of ectopic gestation has been so fully recorded and so well illustrated in the Obstetrical Society's *Transactions* (vol. xl., 1898, pp. 285-292) that it is unnecessary to say more about it here. It is, so far, the only instance in which, in my own practice, I have met with this condition as a complication of fibro-myoma.

Of the two cases of twisted pedicle, one has been already recorded in the course of this paper (Case 22), whilst the other, a pedunculated fibro-myoma of the broad ligament, formed the subject of a short communication to the Obstetrical Society of London, and will be found fully described in the Society's *Transactions* (vol. xxxvii., 1895, p. 222).

It is noteworthy that, in the whole series of 100 cases, salpingitis was not once met with. When it does occur in connection with uterine fibro-myoma, I believe it to be a mere coincidence. I know that a contrary view has been maintained, but I do not myself see how a fibro-myoma, except in the comparatively rare instance of its having become septic, can be directly responsible for a condition like salpingitis, which, so far as we know at present, is always the result of infection.

My paper is already too long, but there are still two points to which I should like briefly to refer—viz.: (1) the value of pain as an indication of degenerative change, and (2) the ages of the patients.

Pain is recorded as having been a noteworthy feature in thirty-eight cases. Of these, ten were cases in which the tumour was simply necrotic (the total number of such cases being fifteen); two were cases in which the tumour was infected as well as necrotic (the total number of such cases being three); three were cases in which the tumour was cystic (the total number of cystic cases being five); eight were cases in which the tumour was softened by so-called œdema (the total number of such cases being twenty-seven); one was the single case of myxo-sarcoma. In five cases the pain was accounted for by conditions outside the uterus (serious adhesions, hydrosalpinx, ovarian disease, etc.), whilst in the remaining eleven no special cause could be found for the pain either in the state of the tumour itself or in the conditions around it. Pain, therefore, was a marked symptom in two-thirds of the necrotic cases, in three-fifths of the cystic cases, and in nearly one-third of the œdematous cases. At the same time it must be noted, before any conclusions are drawn from these figures, that pain was complained of in about one-third of the uncomplicated cases—the cases, in short, in which there was nothing to account for it.

The following table, giving the ages of the patients, is remarkable for the comparative evenness with which the cases are diffused over a wide range:

Age.	No. of Cases.	Age.	No. of Cases.
23	1	Brought forward	58
26	1	41	3
27	2	42	3
28	1	43	5
29	3	44	5
30	4	45	7
31	2	46	3
32	4	47	2
33	2	48	2
34	3	49	2
35	7	50	2
36	8	51	4
37	5	52	1
38	4	55	1
39	7	56	1
40	4	61	1
Carried forward	58	Total	100

The following are the ages of the patients who had œdematous, cystic, and necrotic tumours respectively:

ŒDEMATOUS.

Age.	No. of Cases.	Age.	No. of Cases.	Age.	No. of Cases.
26	1	38	2	44	3
29	1	39	1	48	1
30	2	40	1	50	2
33	1	41	1	51	2
34	1	42	2	52	1
36	3	43	2		

CYSTIC.

Age.	No. of Cases.	Age.	No. of Cases.	Age.	No. of Cases.
23	1	39	1	49	1
36	1	46	1		

NECROTIC.

Age.	No. of Cases.	Age.	No. of Cases.	Age.	No. of Cases.
27	1	36	1	44	1
29	1	37	2	45	2
30	1	38	2	46	1
34	1	40	1	56	1
35	1	41	1	61	1

There is a preponderance of cases (though not, perhaps, so decided as one would have expected) between the ages of thirty-five and forty-five inclusive, more than half the total number being embraced within these limits. Special interest is attached to the exceptional cases found at the two extremes of the table. The fact of one of the patients being only twenty-three shows that fibro-myomata cannot be excluded from consideration when diagnosing a solid pelvic or abdominal tumour even at that early age. The details of the case are recorded in the earlier part of this paper (Case 6). The cases at the other extreme derive their interest from their bearing upon the question of the influence of the menopause upon these tumours—a question of great importance, but one which I cannot here adequately discuss. Both the cases in which the patient's age exceeded fifty-five are given in detail in the foregoing pages (Cases 9 and 12).

It may perhaps be expected that I should, notwithstanding the already too great length of my paper, formulate some conclusions from the facts here set forth. I prefer not to do so. In the first place, the number of cases is not large enough for safe generalization, and, in the second place, I wish to avoid the impression of having arranged my facts to support a preconceived opinion. I sincerely trust that other observers will record their experience. We may then hope to obtain a body of evidence by which we may safely allow our judgment to be guided in determining the very difficult questions that these cases continually present.

CONTRACTION AND RETRACTION OF MUSCULAR FIBRES, WITH SPECIAL REFERENCE TO THE UTERUS.

By PETER HORROCKS, M.D., F.R.C.P.,
President of the Obstetrical Society of London; Obstetric Physician to Guy's Hospital.

Muscular fibre is either voluntary or involuntary; the former is striated, and the latter unstriated, the exception being the fibres of the heart, which, though striated, are involuntary.

Striped or unstriped, voluntary or involuntary, the great and essential characteristic of muscular fibre is its power of contraction —*i.e.*, its power of shortening so as to draw its extremities nearer together.

Thus, when the biceps muscle of the arm contracts, its insertion into the forearm draws the latter upwards towards its origin from the shoulder, and the result is flexion of the forearm on the arm. Again, the triceps muscle contracts and pulls up the olecranon process of the ulna towards the shoulder, producing extension of the forearm.

But contraction is not quite so simple as this, and if one were to define it as a shortening of the fibres, whereby the ends were drawn nearer together, we should find that such a definition would not always hold good, inasmuch as a muscle may contract and yet its extremities may not be approximated at all. Thus, supposing the left forearm be flexed by the right hand as far as possible, so that the origin and insertion of the biceps are as near together as they can be, it will be found that the biceps can be made to contract or relax at will; each contraction causes the shape of the muscle to alter, and each relaxation causes it to pass into its previous condition, and yet the ends of the muscle (origin and insertion) are unaltered so far as nearness to one another is concerned.

Hence, contraction of a muscular fibre may be defined as the power to alter its condition so as actively to pull on its attachments (origin and insertion), and so bring them, or tend to bring them, nearer together. Doubtless in the great majority of instances they are brought nearer together, but occasionally, as in the example just given, this is not the case, simply because they are already as near as they can be. And yet the muscle contracts. It is thus seen that the word *contraction* as applied to a muscular fibre must not be

limited to a mere shrinking in length—that is, shortening—as was perhaps the original intention of the earliest physiologists who gave it this name.

Moreover, when a muscular fibre contracts, and its attachments are approximated, then it not only shortens, but it thickens, and, in

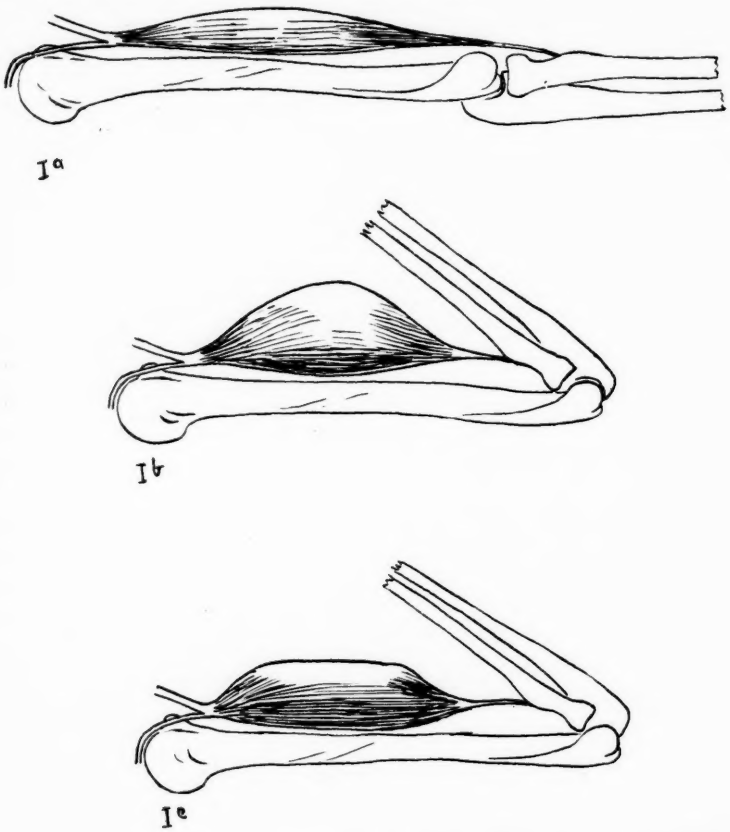

FIG. 1.—(*a*) SHOWS BICEPS EXTENDED TO THE FULLEST EXTENT; (*b*) SHOWS BICEPS IN ACTIVE FULL CONTRACTION; (*c*) SHOWS BICEPS IN PASSIVE FULL RELAXATION (RETRACTION).

fact, it thickens in exact proportion to the amount of shortening, and therefore, it is found that no matter how much it shortens in its contraction, there is no diminution of bulk.

This has been proved by causing a muscle to contract in a fluid, like water; the height of the water in the vessel is just the same before and after contraction. Again, when a muscle, whose ends are

already as near together as they can be, contracts, it alters its shape, and becomes more spheroidal, and at the same time harder. This fact can be illustrated by the biceps muscle again. Let its attachments be approximated as much as possible by flexing the arm on the forearm with the other hand. Now, if the biceps of the flexed limb be felt, it feels soft, and its shape varies according to its size, but is somewhat cylindrical. Now let the biceps be thrown into activity, and it assumes a more or less spheroidal shape, and feels hard.

Doubtless the arrangement of the fibres is different according to the state of the muscle in extension, active contraction, and passive relaxation respectively, but the exact nature of this difference of arrangement has not yet been determined.

Almost all text-books on physiology describe a simple muscular contraction as consisting of—

1. The latent period.
2. The shortening or contraction.
3. The relaxation or return to the original length.

In order to understand what is to follow, it is necessary to state exactly what is meant by these three phases.

1. *The Latent Period.*—When a muscle is stimulated to contract, it is found that a certain length of time—generally about a hundredth of a second—elapses before contraction begins. This is called the *latent period*, and during this period certain changes are undoubtedly taking place. For instance, there is a negative variation in the electric current.

The most modern investigations seem to show that the latent period is much shorter than a hundredth of a second.

2. *The Shortening or Contraction.*—All the books on physiology look upon contraction as synonymous with shortening, and if this were true, then whenever a muscle contracted it would become shorter, and therefore its extremities would be approximated.

In the example given of the biceps, there is a muscle which contracted and yet which did not become shorter, because its ends were already as near together as they could be got. It is possible that an explanation may be found in this, namely, that the individual fibres contract and actually shorten, and that it is this combined shortening which causes the belly of the muscle to alter its shape towards a sphere, although the tendinous ends of the muscle are not approximated.

3. *The Relaxation or Return to the Original Length.*—The phenomena of a contracting muscle have been observed chiefly in the frog. One

of the thigh muscles is used, and one end is cut away from the bone and a weight is attached. The muscle is now made to contract by a stimulus of some sort. When the active contraction is over, the weight attached to the muscle pulls upon it, and draws it out to its original length. This is called the *relaxation or return to the original length*. Now, if there were no weight attached to the muscle it would not return to its original length, although the activity of the contraction would pass away. Thus, in the example already given, the ends of the biceps can be kept as near together as it is possible to

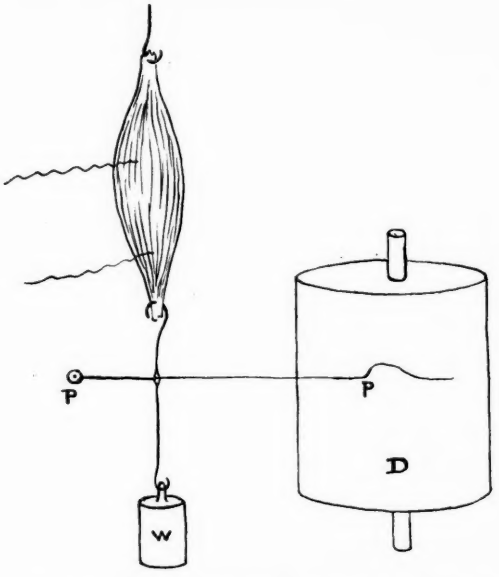

FIG. 2.--SHOWS SIMPLE APPARATUS FOR RECORDING A MUSCLE CONTRACTION.

W, Weight; *D*, drum; *P*, pivot with writing point.

bring them by means of the other hand. The biceps can be made to actively contract without shortening, as already described, and can be allowed to relax without lengthening. It may be argued that it would lengthen if it were not for the fact that the forearm is being held in a state of flexion by the other hand. To perceive that this is not true needs very little thought. If it were so, then the biceps would not only be a *flexor*, but also an *extensor* of the forearm.

It will be noticed that the word *relaxation* is used in most works on physiology to connote not merely the passing off of the state of active contraction, but also the lengthening out again to its former

extended condition. Now, inasmuch as the muscle can relax simply and yet remain short, and the word *relaxation* is used to mean this only, great confusion has arisen in the minds of many students. In order to be as clear as possible, it will be necessary to define precisely what is meant when this word is used.

It is probable that no muscular fibre, of whatever kind, is capable by itself of returning to its former lengthened condition. If this be true, it is a fact of the greatest importance. The following evidence is offered to support the theory:

Dr. ——* placed a fresh muscle cut from the thigh of a newly-killed frog upon a layer of quicksilver, in order to reduce friction as much as possible. He then sent an electric current into this muscle, and it contracted actively, and became short and thick. The current was applied in sufficient strength to make the muscle contract and shorten to its fullest extent. When the effect of the stimulus had passed off, the muscle *relaxed*—that is, it became softer, and its shape altered, becoming more cylindrical and less spheroidal, but its length remained the same.

I have repeated this experiment with the help of Dr. Starling, at one time physiologist at Guy's Hospital, and now Professor of Physiology in University College, placing the muscle on quicksilver with a layer of oil floating on the surface, in order to reduce friction to a minimum, and the result has fully confirmed Dr. ——'s. A strong electric current from a Ruhmkorff's coil caused the muscle to contract forcibly, and to shorten as far as possible. When the current was withdrawn the muscle soon relaxed, but it remained short, and merely altered its shape, becoming less spheroidal.

Another fact which points in the same direction is that every muscle in the body has an opponent. This is not always another muscle. The flexors of the body are opposed by the extensors, and *vice versâ*. When the biceps contracts and shortens, it is drawn out again to its former length by the contraction and shortening of its opponent, the triceps, and *vice versâ*.

Some have asserted that extension of a muscular fibre is brought about in certain muscles by means of other muscular fibres curling round them in a spiral manner, as seen in Fig. 3. When the fibre contracts the spiral is widened, and so stretched. When the spiral fibre contracts, it lengthens or stretches the contained fibre.

In some instances the opponent is not a muscle. It may be the

* I have been unable to find the name of the first experimenter, but it is referred to in Rosenthal's 'General Physiology of Muscle and Nerve,' and was described by Prevost and Dumas.

recoil of an elastic substance, such as the elastic ligaments, or it may be hydrostatic pressure. Thus, when the heart contracts it drives the blood out of its cavities into the pulmonary artery and aorta respectively, and when the active contraction passes off, and the fibres relax, they are stretched out again by the blood pouring into the cavities through the vena cava and pulmonary veins respectively. But the most interesting example of this hydrostatic action is the pregnant uterus. When the muscular fibres of the uterus contract, the effect is to bring pressure to bear upon the contained liquor amnii. If it were possible to have the bulb of a barometer inside the cavity, the mercury would rise in the barometer according to the strength of the contraction.

The late Dr. Matthews Duncan found experimentally that, on an

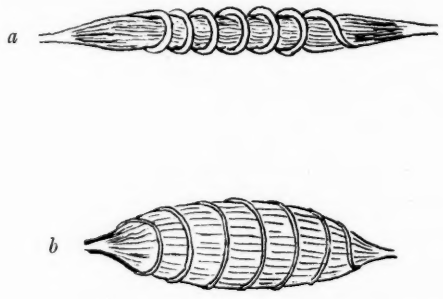

FIG. 3.—DIAGRAM TO SHOW MUSCLE FIBRE WITH HYPOTHETICAL SPIRAL FIBRE AROUND.

a, Muscle fibre stretched, spiral fibre contracted; *b*, muscle fibre contracted, spiral fibre stretched.

average, it required a force of 15 pounds to rupture the membranes, and from other facts made by different observers it is certain that the pressure exerted is often greater than this. Now, there is a law in hydrostatics that, whenever a fluid like water is submitted to a given pressure, this pressure is transmitted equally to all parts of the fluid. If the pressure caused by the contraction of the uterus be 15 pounds to the square inch, then every square inch touched by the amnion has this pressure upon it. Hence, when the active contraction of the fibres passes off, and they become relaxed, this 15-pound pressure to the square inch comes into play, and forces out the uterine cavity in all directions, thereby stretching or extending the muscular fibres to their previous length. In other words, this hydrostatic pressure is the opponent of the contracting fibres of the uterus, and they have no other, so far as is known.

The uterus is made up almost entirely of muscular fibres, and they are all unstriped and involuntary. The uterus contracts at varying intervals throughout pregnancy. The late Dr. Braxton Hicks wrote papers in the *Obstetrical Transactions of London*, vol. xiii., and in the *Medical Press and Circular* for 1894, on these contractions. They are quite palpable in the later months of pregnancy, although the patient is unconscious of them; in fact, they are painless uterine contractions. In all probability they go on, not only throughout pregnancy, but also in the non-pregnant state.

In the Guy's Hospital Reports for 1881 I showed that the muscular fibres of the iris were constantly contracting and relaxing,

FIG. 4.—RIGHT HAND HOLDING LEFT FOREARM IN A CONDITION OF COMPLETE FLEXION; THE BICEPS IS SEEN WITH ITS ATTACHMENTS APPROXIMATED AS MUCH AS POSSIBLE, ALTHOUGH IT IS NOT IN ACTIVE CONTRACTION.

causing slight alterations in the size of the pupil, independently of light or accommodation, and it is extremely probable that every muscular fibre in the body during healthy life is undergoing these constant changes. Be that as it may, the painless contractions and relaxations of the uterus described by the late Dr. Braxton Hicks can be observed by anyone who will take the trouble, and they are of very great importance in diagnosis, because no other condition is like it. It is true that a soft fibroid of the uterus which is made of muscular fibre is said to undergo similar contractions and relaxations, yet it is so different in degree that anyone who has had

experience can appreciate the difference in a moment. In fact, so slight is this contraction of a fibroid tumour that it is extremely difficult to detect, whereas the painless contraction of an enlarged uterus, when felt, is distinct and unmistakable. Hence, it serves to show that it is the uterus, and not a tumour. Of course, it may not be a pregnant uterus, because if a uterus were enlarged by an intra-uterine polypus these contractions could be felt, though, as a rule, they are then painful, like ordinary labour pains.

Sometimes the uterus can be felt to contract in cases of extra-uterine gestation, but in such a case it is a comparatively small body, owing to the absence of fœtus and membranes and the liquor amnii from its cavity. Sometimes the contractions of the uterus in a non-pregnant state are felt by the individual, especially during menstruation, and the pain produced is often great, and forms one of the commonest and best-known kinds of dysmenorrhœa.

Hitherto contraction of muscular fibre has been spoken of, and the difference between simple relaxation and stretching or extension has been pointed out. To return again to the biceps muscle. First of all it is in a state of rest, and extended to its utmost length (*vide* Fig. 1, *a*). Now it is thrown into active contraction, with the result that the forearm is flexed on the arm by the shortening of the fibres, and the approximation of the attached tendinous ends of the muscle (*vide* Fig. 1, *b*). It is seen that the belly of the muscle is more or less spherical. Now, whilst keeping the forearm completely flexed by holding it with the other hand, the active contraction of the biceps is allowed to cease; in other words, it is allowed simply to relax. It is noticed that the belly of the muscle becomes less spheroidal and more oblong—in fact, it is wider from side to side, and not so thick from before backwards as it was; and yet the muscle as a whole is just as short from tendon to tendon (origin to insertion) as it was when the fibres were in active contraction (*vide* Fig. 5). This condition is called *retraction*, which may be defined as the condition of a living healthy muscle, with its nervous reflex loop intact, when a *contraction* is followed by simple *relaxation*, but not by *extension*. If the biceps contracts until the forearm is only partly flexed, and then relaxes, the condition is *partial retraction*. The *retraction* is *complete* when the muscle relaxes after having contracted until it has shortened to its utmost capacity.

The late Matthews Duncan (*vide Obstetrical Transactions of London*, 1886) thought that retraction might go on without contraction, for he says: 'It is a separate and distinct function—that is, it may go on without contractions.' But he added, 'That retraction

is not dependent on contraction is difficult to prove.' The general opinion was that retraction was dependent upon contraction, and was the permanent shortened condition of the muscle after contraction, when the active contraction had passed off—in other words, that the fibres were not stretched out again to their original length (*op. cit.* Galabin, Horrocks, Champneys, and Roper).

Every living muscle in a state of health, and with its nervous mechanism intact, possesses a certain tone or slight contraction, even when in a state of rest. The difference between muscles with tone and the same muscles without is seen when the spinal cord is destroyed. Just before, all the muscles are in this condition of tone, and easily thrown into co-ordinated reflex action; just after, they

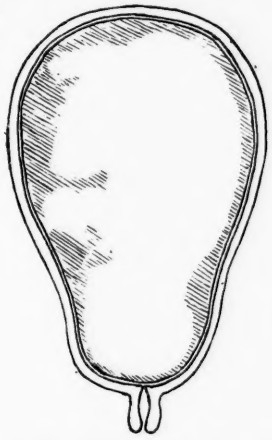

FIG. 5.—DIAGRAM SHOWING SECTION OF PREGNANT UTERUS AT FULL TERM.

are flabby and toneless, and incapable of being stimulated to reflex action.

The combined effect of this tonicity in all the detrusor fibres of a recently-delivered uterus is enough to account for the arrest of hæmorrhage, without seeking for some force special to uterine muscular fibres which is not possessed by other fibres, voluntary as well as involuntary. For it must be remembered that the uterus just after delivery at term is the thickest involuntary muscle in the human body.

Here is a section of the gravid uterus (Fig. 5) near the full term. The fœtus is left out for the sake of clearness. The uterus is at rest; its fibres are relaxed, but stretched out to their fullest

extent, corresponding to the biceps when the forearm is extended (Fig. 1, *a*).

First take a painless contraction occurring a week or two before abour begins. The result of the contraction is to cause the uterus to assume a more spherical shape, the pressure within the uterine cavity is increased, but there is little actual shortening of individual fibres, and practically no diminution in the size of the uterus. When the contraction passes off, the pressure of the liquor amnii forces the fibres back to their original position, and the uterus is no longer quite so spherical, and its walls are felt to be softer and more doughy.

When labour actually begins, the uterine contractions are felt by the patient, and she begins to have pains. The exact cause of the onset of labour is still a vexed question, but, whatever its cause, we know that the internal os begins to open,* and the amnion is driven into it, and each succeeding pain causes pressure upon the liquor amnii, which pressure drives the amnion into the cervical canal and finally against the external os uteri, gradually opening up the neck of the womb until the first stage of labour is complete.

This opening up of the neck of the womb is accompanied by a relaxation of the fibres in the lower zone of the uterus and in the cervix uteri, so that the hydrostatic pressure within the amniotic cavity, which, by the law already alluded to, acts all over the interior of the uterus, finds in these relaxed parts yielding tissues, and as they yield the pressure, of course, lessens, so that when the active contraction passes off there is not enough force left to stretch the contracting shortened fibres back to their original length: for the uterine wall, or, at all events, that portion of it which expels the child, is in a state of *partial retraction* in between the pains, and, as is seen in Fig. 6, the walls are rather thicker. At last the membranes rupture, and there is an escape of more or less liquor amnii, and all pressure within at once ceases. The moment the membranes rupture, the hydrostatic pressure previously exerted by the liquor amnii upon the interior of the uterus ceases, and the uterine contraction which causes the rupture is followed by a con-

* According to some, the internal os is pulled open by the longitudinal fibres which radiate from it up into the wall of the uterus (*vide* Fig. 11). When it is open a little, it is much easier to increase the dilatation, because the resistance of any circular ring to any dilating force acting from within, the tension of the edge remaining the same, varies inversely as the radius of the ring (*vide* Galabin, *Obstetrical Transactions*, 1886, p. 103).

siderable increase in *retraction*, because, as soon as the pain has passed off, the fibres remain as short as that contraction has made them, owing to the absence of the normal hydrostatic extending force (*vide* Fig. 7).

This absolute, complete, and immediate cessation of hydrostatic pressure is made use of in the testing of boilers for steam-engines, etc. The boilers are filled with water, which is subjected to whatever pressure the boiler is expected to withstand, amounting in some cases to hundreds of pounds to the square inch. If there is a flaw in any portion of the boiler, rendering it unable to withstand this trial-pressure, it bursts, but there is no explosion, and no injury

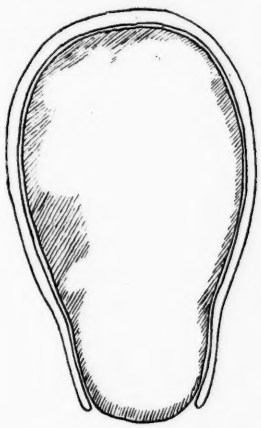

FIG. 6.—SHOWS SECTION OF UTERUS WITH PARTIAL RETRACTION AT END OF FIRST STAGE OF LABOUR.

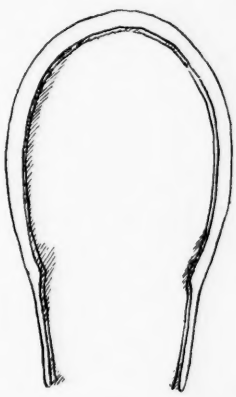

FIG. 7.—SECTION OF UTERUS WITH MORE RETRACTION AFTER RUPTURE OF MEMBRANES.

to anyone, because the hydrostatic pressure is so instantaneously lost. It is different, of course, with steam, which is expansive, and so causes disastrous effects by still exerting enormous pressure even when the boiler has burst.

It is a well-known fact that the uterus immediately after the rupture of the membranes is much smaller than it was just before the commencement of that uterine contraction which ruptured them. How far the elastic recoil of the tissues in the uterine wall assists in this reduction of size, and also in the expulsive powers of the uterus, is questionable. Certainly it is in all probability but little, for muscular fibre, which forms the chief bulk of the wall, possesses very slight, though perfect, elasticity—*i.e.*, it will not stretch much

without breaking, but it returns completely to its former length when the stretching force is removed. Matthews Duncan (*op. cit.*) says that 'the elasticity of the peritoneal covering of the uterus is probably the chief element in the elasticity of the uterus generally.' Very little is known of the elasticity of mucous membranes, but in all probability it is insignificant as a force. Hence, the combined force of elastic recoil in all the constituents of the wall of the uterus is so small that, as Duncan says (*op. cit.*), 'it is not sufficient to keep the uterus taut.' At the same time, when the amnion ruptures and allows the fluid to escape, the pressure on the uterine walls is taken off instantaneously, and thus whatever elastic recoil the walls possess is allowed to come into play.

Of course, if the child's head or other presenting part has become wedged so as to act like a ball-valve, then the conditions are different, and the forewaters—that is, those in front of the presenting part—are cut off from the rest, and so do not behave precisely in the way mentioned, and the afterwaters—or those inside the uterus—are still under pressure after rupture of the membranes. But this could act only momentarily.

After rupturing the membranes there is generally a pause for a short time before active contractions begin again. Each contraction now tends to drive the child through the parturient canal, and, as it descends, the fibres get shorter and shorter. Each shortening, although followed by relaxation, is not followed by extension, as there is no extending force in action. When the child is expelled, the walls of the uterus have become very greatly increased in thickness, as is seen in Fig. 8.

Again there is a pause, lasting for a period varying from a few minutes to several hours, *i.e.*, in a case left to Nature without any artificial aid. The uterus seems to be resting, as it were, from its work. Finally it begins to contract again, and the placenta is detached and expelled, the uterine fibres are shortened to their utmost capacity, and there is *complete retraction* (*vide* Fig. 9). Every now and then the uterus actively contracts, and becomes more or less spheroidal, and feels hard, like a cricket-ball (*vide* Fig. 10); but there is nothing to expel from its cavity, and it is already as short as it can be, and when the active contraction subsides it is less spheroidal, and feels soft and indefinable, although it is in a state of complete retraction. The sum total of the tone of the fibres of the retracted (relaxed) uterus is enough to secure the bleeding vessels, and so to prevent excessive post-partum hæmorrhage.

The active contraction of the empty uterus when it is hard and

spheroidal and easily felt, like a cricket-ball, is only one phase, which is followed soon by the soft, less spheroidal, and impalpable phase, when the fibres are relaxed, though possessing tone. Sometimes during this perfectly natural phase of retraction great efforts are made to alter it to the active state of contraction by kneading and rubbing the uterus as much as possible, even when there is no excessive hæmorrhage and the pulse is good, strong, and normal in frequency. Fear and apprehension is caused unless the uterus can be felt hard like a cricket-ball *all the time*. Such a condition would be a tetanic contraction and would be abnormal, probably continuously painful, and might be accompanied by excessive hæmorrhage.

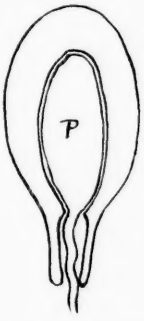

FIG. 8.—SECTION OF UTERUS WITH NEARLY COMPLETE RETRACTION AFTER EXPULSION OF FŒTUS.
P, Placenta.

FIG. 9.—SECTION OF UTERUS WITH COMPLETE RETRACTION AFTER EXPULSION OF PLACENTA.

FIG. 10.—SECTION OF COMPLETELY RETRACTED UTERUS IN ACTIVE CONTRACTION.

The condition of the uterus just after the delivery of the placenta is very much like that of a turtle's heart beating after it has been cut out of the body and when it is empty of blood, the difference being that the contractions of the uterus are slower, stronger, and at longer intervals. At first they occur every few minutes and are often painless. Later they are less frequent and often painful—the so-called 'after pains'—the amount of these being very variable in different women, and even in the same woman in different pregnancies. No doubt they are felt when the contractions are very vigorous, or when the patient is hyperæsthetic, and especially when retained clots or fœtal membranes or decidua have to be expelled.

It can be shown that on the whole it is scientifically better to let the patient alone in natural labours, which constitute the majority

of cases. Some strongly recommend that the hand should be placed on the abdomen in order to follow the uterus down during the actual delivery of the child, as well as during the expulsion of the placenta. Possibly such a procedure, when done skilfully, does no harm, but certainly it is quite unnecessary. To touch the abdomen during the second stage of labour, assuming that satisfactory progress is being made and the patient is in good condition, is equally needless.

After the child is born, it is very bad practice in normal cases to try and expel the placenta by external pressure immediately.

Crédé himself recommended that fifteen to twenty minutes should elapse before attempting to express the placenta, and this seems in order to allow of such changes as retraction, clotting, etc., to take place before the final effort is made. And, indeed, it will be seen that when the third stage of labour is left to Nature, she nearly always waits for a longer or shorter period, and then uterine contractions begin again, and these contractions not only expel the placenta, but result in the maximum amount of shortening of the fibres, and therefore the maximum amount of retraction. Inasmuch as sometimes the uterus remains inert for a very long time, it is perhaps quite justifiable after, say, twenty minutes, to express the placenta.

In the light of what has been already stated, it will be recognised it is better that after waiting twenty minutes, to try by rubbing and kneading the uterus to set up a contraction rather than to expel it one's self by absolute pressure on the uterus. Also, in an adherent placenta, where it is necessary to detach it with the fingers, it is better after completely detaching it to try and start a uterine contraction, or, failing that, to expel it by expression, instead of pulling it out.

After the labour is over, the child and the placenta born, it is quite unnecessary to trouble about the condition of the uterus if everything is satisfactory. If the amount of visible hæmorrhage is not excessive, and if the pulse is full, strong, and not more than 80 or 90 per minute, and there is no pallor, one can assume that there is no abnormal hæmorrhage going on, and the patient may be left alone. If, however, an attempt is made to feel the uterus through the abdominal wall, there need be no alarm even if it cannot be made out. For in such a case it is indefinable because it is soft, relaxed, and, in fact, in a state of retraction. Very likely, if the hand be kept on for a short time, the uterus will contract actively, and will then be felt as a hard, more or less spherical, well-defined body aptly compared to a cricket-ball.

Of course, where there is unusual hæmorrhage, or where the

patient's pulse is too quick, or where she is pale, or in other abnormal conditions suggestive of internal hæmorrhage, then it becomes a matter of grave anxiety if the uterus cannot be felt. Fortunately more than 90 per cent. of labours are normal, and it is to these only that the above remarks apply.

A cricket-ball is a very good simile for the active contracting phase of the uterus just after labour is over. As felt through the abdominal wall, it is about the size and consistence of a cricket-ball, but one obtains a far more complete idea of its condition by thinking of it as a slowly-beating heart now in active systolic contraction, and now in passive diastolic relaxation (complete retraction).

The contraction, relaxation, retraction, and extension of muscular fibre are of great importance in many other conditions—for instance, in the case of the heart and the diseases connected with it. But two conditions that are immediately connected with midwifery and diseases of women may be mentioned. One is rupture of the perinæum. The circular fibres which surround the anus are called the sphincter ani. Now, if the perinæum is torn completely through into the rectum, all these circular fibres are severed; they contract and then relax, remaining in this shortened condition in a state of retraction. There is no extending power, and the broken ends of the fibres can be felt quite distinctly on each side of the lacerated perinæum. It is the object of an operator to draw out these fibres again, to extend them, in fact, and sew them together so that when they have united they shall be capable, not only of contracting, but also of shortening.

Another use made of our knowledge of retraction of muscular fibres is in the operation on fibroid tumours of the uterus when they are polypoid. We can cut pieces out of a large fibroid so as to make it smaller, and we can cut through the pedicle with scissors or a knife without fear of hæmorrhage, because the structure is muscular fibre, which, on being cut, at once contracts and closes the severed bloodvessels. Moreover, even when relaxed there is retraction, which still stops hæmorrhage, and there is no extending force to draw out the fibres.

The Law of Polarity.—Stated briefly, it is this: 'When a muscle contracts, its opponent relaxes.' Thus when the flexors of the forearm contract, the extensors relax; and *vice versâ*, when the extensors contract, the flexors relax. When the circular fibres of the iris contract, the radiating fibres relax, and the result is that the pupil of the eye gets smaller. When the radiating fibres contract, the circular fibres relax, and the pupil dilates.

In the case of hollow organs, such as the bladder, heart, uterus, etc., strictly speaking the pressure of the contents of these cavities act as opponents to the contracting fibres. Thus the urine as it accumulates in the bladder gradually distends the walls and so stretches the muscular fibres.

The sphincter muscles assist, however, inasmuch as they keep the orifice closed. If it were not for this, the fluid would run out, and so there would be no hydrostatic pressure within the cavity, and so no extension or lengthening out of the muscular fibres of the walls of the cavity.

In the bladder the expelling fibres, called *detrusor* fibres, are arranged in such a way that when they contract they tend to drive the contents out through the urethra.

The internal orifice of the urethra is kept closed by the retraction of the circular fibres arranged round the neck of the bladder, and called the 'sphincter vesicæ.' They act as opponents of the detrusor fibres in the way already described; when they relax the pressure of the urine causes them to stretch, so as to open the internal urethral orifice and allow of the expulsion of the urine. It is possible that there may be fibres radiating from the internal orifice of the urethra, contraction of which help to open the orifice.

Similarly the lower zone of the uterus and the cervix uteri form practically a kind of sphincter muscle of the uterus, and when the expelling or detrusor fibres of the body and fundus of the uterus contract, these sphincteric fibres relax, and the result is that they are stretched or extended by the pressure brought to bear upon the liquor amnii and amnion by the contracting detrusor fibres.

If the amnion is ruptured, then these relaxed fibres are stretched by the presenting part of the child, which is driven down by the pressure from above. In this case the pressure is unequal, and hence is apt to be less satisfactory.

One of the commonest mistakes made by students when asked to state the law of uterine polarity is to say that when the body and fundus of the uterus contract, the lower zone and cervix *dilate*. It is true they are often dilated, but not unless there is something to dilate them. Possibly the radiating fibres may assist in dilating. The law is, that when the body and fundus contract, the lower zone and cervix uteri *relax*, and hence whilst in this state of relaxation they are capable of easy extension, that is, dilatation by an extending force, such as that exerted by the pressure of the liquor amnii on the amnion, or by the pressure of the presenting part.

Nevertheless, it would appear that there is a mechanism whereby

the cervical canal and lower zone of the uterus can be expanded and dilated independently of pressure by the liquor amnii or the presenting part of a child; for it must be the experience of most accoucheurs to occasionally meet with cases where the first stage of labour is completed in the absence of both of these agencies. For instance, I have myself seen the cervical canal completely dilated, and the os uteri expanded and capable of admitting several fingers in a case of hydatid mole before the mole had come down into the cervical canal, and so before it could have exercised any dilating pressure. This is to be explained, I think, by the longitudinal fibres found in the lower zone of the uterus and in the cervix uteri. I have tried to depict in this diagram (Fig. 11) the numerous expelling or detrusor fibres of the uterus which actually expel the child, and also the less numerous longitudinal fibres which run down to the external os. Obviously the contraction of these fibres would tend to open the os uteri and the cervical canal and the lower zone

FIG. 11.—CERVIX UTERI SHOWING HYPOTHETICAL ARRANGEMENT OF CIRCULAR AND LONGITUDINAL MUSCLE FIBRES.

of the uterus quite independently of the dilating wedge of amnion and liquor amnii, or fœtal skull or other presenting part. In sphincter muscles generally there may be radiating muscular fibres to assist dilatation. Should the circular fibres of the lower zone and of the cervix uteri remain in a state of contraction the result is what is known as a *rigid os* and *rigid cervix*, one of the most troublesome things in midwifery. Whether it is due to a flaw in the working of the law of polarity or not has not been determined, but it is very probable, and this may also be the explanation of the condition of 'hour-glass contraction,' or, as the late Matthews Duncan preferred to call it, 'hour-glass relaxation' (*vide* Champneys in *Obstetrical Journal*, 1879-80). Naturally the walls of the lower zone, and of the cervix uteri and of the vagina, become thinner as they get stretched by the child's head. This is seen in Fig. 12.

When labour is over there is a certain amount of elastic recoil, particularly in the vaginal walls, which are much more elastic than those of the uterus. The muscular fibres are apparently paralyzed

for a time, and indeed, as is well known, there is nearly always a certain amount of laceration. After a time, however, they recover themselves, and begin to contract and retract. The circular fibres of the lower (dilating) zone of the uterus contract and retract before those of the cervix.

When labour is obstructed and the uterine contractions are maintained, there is formed a distinct ring of demarcation, which is believed by most observers to represent the place of meeting of the ends of the detrusor or expulsive fibres with the circular relaxed

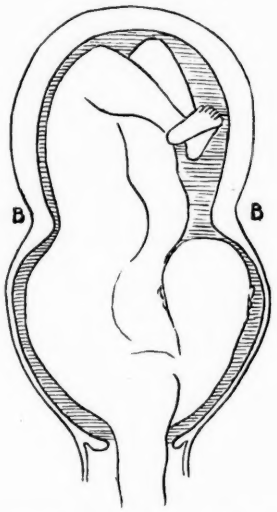

FIG. 12.—SECTION OF UTERUS SHOWING PATHOLOGICAL EFFECT OF RETRACTION IN AN OBSTRUCTED LABOUR.

BB, Bandl's ring.

fibres in the lower zone of the uterus. When well formed this so-called ring of Bandl presents a groove on the surface of the uterus, and a projection within its cavity (*vide* Fig. 12). At all events, the detrusor contracting fibres above the ring contract and shorten as much as they are able to with the child still unexpelled. Hence the walls of the fundus and upper two-thirds of the body of the uterus are seen to form a thick cap over the child (Fig. 12).

A study of the action of the uterus in pregnancy and labour points unerringly to the fact that the fibres are under obedience to certain laws. And a comparison of their actions with those of muscular fibres in other parts of the body leads to the conclusion that the nervous system is intimately associated with the carrying

out of these laws. Many think that parturition is a reflex act. As before mentioned, for a reflex act are required a stimulus, an afferent nerve, a nerve centre, an efferent nerve, and a muscular fibre or other agent. As to the stimulus, it is still a vexed question, but it seems to be most probable that the actual labour pains are brought about by the gradually increasing strength of the painless uterine contractions, associated maybe with gradual relaxation of the sphincter fibres around the internal os, which permits the liquor amnii to force the amnion slightly into the internal os, which causes an irritation of the nerve endings in that neighbourhood. These are the afferent or sensory nerves which carry the stimulus to the nerve centre. This centre is supposed to be in the lumbar portion of the spinal cord, and the stimulus is reflected from this centre down the efferent or motor nerves to the muscular fibres of the uterus, causing those of the fundus and body of the uterus to contract, and those of the lower zone and cervix uteri to relax. Certain it is that parturition can take place during unconsciousness, proving that the will-power is not essential. No doubt voluntary efforts are helpful, but they are not essential, and they could not of themselves expel the uterine contents. Again, in certain paralytic conditions where the spinal cord is diseased so as to cause an absolute loss of both sensation and power below the seat of the disease, it has been found that parturition goes on almost as well as where there is no such disease. Whether it would do so if the nerve connections between the uterus and the spinal cord and the sympathetic nerve system were severed, is an open question. Some think the uterus contains its own ganglia and nerve connections like the heart, and hence it could act quite independently of the general nerve system. Be that as it may, it is quite certain that in ordinary normal labour in a healthy woman the uterus is supplied with nerves which are connected with the sympathetic and spinal systems.

Moreover, we utilize our knowledge of reflex acts when we want to induce labour. The plan recommended in text-books is to pass a bougie into the uterus between the membranes and the uterine wall. This acts as a stimulus, and the irritation causes the uterus to contract by reflex action. If the stimulus be applied in the neighbourhood of the internal os, the reflex act is more speedy and certain.

It was for this reason I advocated the use of small indiarubber bags fixed on the end of a gum-elastic catheter, and introduced just within the uterus, so as to be close to the internal os, and then filled with fluid, with the object of inducing miscarriage or labour. The

nerve-endings are irritated, and so reflex uterine contractions ensue, and by the time the little bag is expelled the bag of waters (liquor amnii) has descended, and so labour is carried on in the natural way. I have tried many different fluids, such as diluted carbolic acid, perchloride of mercury, boracic acid solution, lysol, etc., but the most potent in speed and certainty is a solution of tincture of iodine in the proportion of 2 drachms to 1 pint of water. On the reflex theory, this is only what might have been expected, because tincture of iodine is a very penetrating and irritating fluid, and one generally finds that the contents of the little bag are quite colourless when the bag is expelled, showing that the iodine has somehow escaped or has been neutralized. Moreover, the onset of uterine pains is much quicker when this solution is used.

Again, if one considers for a moment the progress of labour, one sees that at first the nerve-fibres about the internal os, the lower zone and cervix uteri, are irritated, and the resulting pains are of a certain magnitude. Then, when the head of the child is expelled into the vagina, one has, in addition, the nerve-endings in the vagina irritated, with a consequent increase in the strength of the reflex muscular contractions, and at last, when the perinæum is stretched, and the vaginal orifice widely dilated, one gets the sensory nerves of these parts stimulated, and so there is a mighty result in the strong expulsive uterine contractions so characteristic of that stage of labour. The afferent impulses increase in number as the child's head descends, and as a consequence the reflex act—that is, contraction of the expulsive fibres and relaxation of the sphincteric fibres—correspondingly increase. Possibly a time will come when we shall be able to regulate uterine contractions and relaxations as easily as switching on and off an electric light, but if ever that time comes, it is to be hoped there will come with it an adequate knowledge of when it is necessary or justifiable to set these fibres into action, or to cause them to relax.

When one studies the action of muscular fibre, and the laws which govern its action, and the structure and arrangement of the fibres in the uterus, and all the mechanism concerned, one sees how greatly superior Nature's method is to any artificial plan yet invented. Consider, for instance, the method adopted by Nature in completing the first stage of labour, or dilatation of the os uteri and cervical canal. In the first place, the force used is water-pressure; secondly, whilst the pressure is brought into play, the fibres which have to be stretched are at the same time physiologically relaxed; thirdly, the pressure is intermittent; fourthly, the force of the pressure gradually

increases in amount. Compare this with the best method we know for artificially dilating the same parts—namely, a Champetier de Ribes bag. Certainly it is water-pressure, but whilst it is in action we have no means of relaxing the fibres to be stretched. Not only so, but the pressure is constant, and as the fibres yield it gradually lessens in amount. It is best to imitate Nature's plan as nearly as possible, viz., to occasionally let the fluid out of the bag, in order to give the parts a rest, then to inject rather more fluid than before, in order to exert more pressure, and to make up for the amount of yielding or stretching that the fibres have already undergone.

As a summary, the following points may be stated:

1. Contraction of a muscle is generally, but not always, accompanied by an approximation of its two ends.

2. When a muscle is shortened to its fullest extent, it can relax or contract without becoming longer or shorter.

3. When a muscle contracts, it is unable of itself to return to its former condition; some other muscle or force is required to pull it out or extend it.

4. When a muscle contracts, and then simply relaxes, it is in a condition called retraction.

5. Retraction is the condition of a muscle which having been shortened by contraction, the active contraction has given place to simple relaxation without extension.

6. In a state of retraction there is a slight and constant contraction called tone.

7. Retraction may be partial or complete, according to the amount of preceding contraction. If the muscle has contracted to its fullest extent before relaxing, the retraction is complete; if anything less than its fullest extent, it is only partial.

8. Retraction of the uterus in labour affects only the expulsive fibres of the fundus and upper two-thirds of the body of the uterus. It keeps the sinuses and broken bloodvessels of the placental site closed, and is therefore of the greatest importance.

9. After the third stage of labour, the uterus sometimes is in an active state of contraction, when it is more or less spherical, and feels hard and well defined in outline, and sometimes in a state of relaxation, when it is less spherical, softer, and not so defined in outline; but such a condition is quite normal, and in no way indicative of danger.

10. Labour pains are in all probability reflex acts.

11. The less they are interfered with the better.

12. Complete retraction of the uterus is the safest condition for the prevention of post-partum hæmorrhage.

13. Complete retraction is obtained by complete contraction followed by relaxation.

14. The law of polarity, as applied to the uterus, is that when the expulsive fibres contract the sphincteric fibres relax, and permit themselves to be stretched or extended.

15. The cervical canal can be opened up apart from pressure from within, and this is accomplished probably by relaxation of the circular fibres, and contraction of the longitudinal fibres in the cervix and lower zone of the body of the uterus.

16. The painless uterine contractions taking place during pregnancy are not followed by retraction, because the fibres are stretched out again by the hydrostatic pressure of the liquor amnii.

LITERATURE.

BANDL: 'Ueber das Verhalten des Uterus und Cervix in der Schwangerschaft,' 1876; and *Archiv für Gynak.*, Band xii.

BRAXTON HICKS: *Obstetrical Transactions*, vol. xiii.; and *Medical Press and Circular*, 1894.

BUMM: *Archiv für Gynak.*, Band xxiv., S. 42.

CHAMPNEYS: *Obstetrical Journal*, 1880.

DUBOIS and PAJOT: 'Accouchements.'

MATTHEWS DUNCAN: *Obstetrical Transactions*, 1886; and 'Mechanism of Natural and Morbid Parturition.'

FOSTER: 'Text-book of Physiology.'

GALABIN: *Obstetrical Transactions*, 1886.

GOWERS: *Medico-Chirurgical Transactions*, 1879: 'On Movements of the Eyelids.'

HORROCKS: *Guy's Hospital Reports*, 1880-81: 'On Reflex Action in Diagnosis.'

JACQUEMIER: 'Manuel des Accouchements.'

NORRIS: 'Text-book of Obstetrics,' Part I., p. 438.

ROPER: International Medical Congress in London, vol. iv., 1881, p. 362.

ROSENTHAL: 'General Physiology' (quotes Prevost and Dumas).

AMAND ROUTH: *Obstetrical Transactions*, 1897.

WILLIAMS: *Obstetrical Journal*, 1874-75.

OBSTETRICS AT THE BEGINNING OF THE TWENTIETH CENTURY: AN ATTEMPT AT AN APPRECIATION.

By D. BERRY HART, M.D.,

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'It is that which we do know which is the great hindrance to our learning that which we do not know.'—CLAUDE BERNARD: Foster's Life, p. 206.

IT is a happy omen of the strong Imperial feeling that has arisen, or rather culminated, at the beginning of the twentieth century that Anglo-Saxon obstetricians and gynæcologists should signalize it by the establishment of a journal of obstetrics and gynæcology of the British Empire. The idea is a great one, and it now devolves on us all to maintain and develop it in a manner worthy of the Empire. It is easier to begin than to carry on successfully such a task, but a united effort should accomplish both with ease.

The more immediate object of this communication is to attempt an estimate of our obstetric knowledge—the main truths we have inherited from our predecessors and added to by the researches of those still with us. The task is a difficult one, and the difficulty is increased by want of time and space, but most of all by the limitations of my knowledge and judgment. I shall endeavour, however, to make this appreciation as accurate and succinct as possible.

In **Embryology** we have now, thanks mainly to German observers, a very complete series of observations on the anatomy of the early embryo. Up till the great work of His, we depended for our knowledge on the classical specimen of Reichert (1873), and the embryos described by Allen Thomson and Wharton Jones. Now we can study specimens ranging from one of a few days old up to the stages where microscopic investigation is not necessary for anatomical purposes. Our methods of investigation are immensely improved, and the combination of serial sections by the paraffin method, with model-making based on such sections, has given the greatest accuracy to our knowledge. Most of this research has been done in Germany, very little—indeed, almost none at all—in Britain; while America has, in the work of Minot and Mall, given us some excellent results.

The early pregnancy described by Peters of Vienna is a striking one, and in many respects most valuable. The special question it suggests in regard to the early formation of the embryo is: Does the embryo not form by an inversion of the layers rather than from the oval flattened embryonic area so usually described? The so-called inversion merely means that the embryonic area is at first a plug which breaks down, as we shall see, centrally, to form amnion and embryo. Several authors have suggested this idea, but Peters' embryo, and a similar one in my possession, go far to prove it.* Older specimens by Graf Spee, Keibel, His, and others, are not inconsistent with this mechanism, and I venture to predict that in the future it will be the accepted one.

I might also have pointed out the great increase of our knowledge in regard to the development of the Müllerian and Wolffian ducts, as well as that of the ovary, but it would be difficult to do so without illustration, and might elbow out important practical points. An inspection by teachers and students of Keibel's models would show this in a very graphic manner.

THE AMNION.—Hitherto, the obstetrician has described the amnion originating as in the chick by somatopleuric folds rising up, coalescing, and thus cutting off amnion and embryo from the temporary chorion. To attach the embryo once more to the chorion, he supposed the allantois to grow out and effect the required mooring. Peters' ovum and my own show, however, the amnion formed, and yet *still embedded in mesoblast—i.e.*, it has not formed by free folds. The development in the chick, therefore when applied to amniotic development in the human embryo, does not explain, but merely perplex. The difficulty disappears, however, when we find that it apparently develops as in the guinea-pig—viz., by the central breaking-down of an ectodermic plug, and this idea will also be found most suggestive in teratology.

THE CORD, MEMBRANES, AND PLACENTA.—His got over the difficulty of the non-attachment of the embryo owing to absence of allantois, after the somatopleuric folds had risen up to form the amnion, by supposing that the embryo did not really separate from the temporary chorion, but simply settled down a little, and that the slight dent on the chorionic surface thus made was bridged over by a growth of the temporary chorion. The cord is thus in its early stages merely the posterior end of the embryo. One practical result of this is that the cord cannot be covered by amnion, but is really a modified or embryonic skin (Minot). The practical obstetrician can

* I hope soon to publish proof in regard to this point.

convince himself of this by stripping the amnion from the surface of a third-stage placenta, and noting that it ceases to do so at the root of the cord. It is not creditable to us that such an evident fact should have been so long overlooked.

In regard to the deciduæ, Peters has demonstrated the remarkable fact that in his specimen the folds of the reflexa have not met. I had previously suggested that the ovum after fertilization grafted itself on connective-tissue, the epithelium having been removed in the menstrual process. As an alternative hypothesis, I tried to apply Hubrecht's well-known description of the fertilized ovum removing the epithelium of the decidua in the hedgehog, and thus becoming embedded in the serotina. Peters follows the latter idea. It results from this that the reflexa is merely the superficial part of the serotina, and we may thus adopt Leopold's nomenclature of decidua capsularis (decidua reflexa) and basalis (serotina).

On the structure of the placenta we have now much more exact knowledge. William Hunter, or it may have been John, first clearly demonstrated the nature of the intervillous circulation, and, thanks to the researches of Goodsir, Turner, and Waldeyer, we are certain that the maternal blood circulates round the villi, and that the intervillous spaces are not empty during life. Full details are now known, and Minot has given by far the clearest account of this I have read.

The structure of the *villus* is by no means so clearly worked out. The dispute is not so much the structure of the core, as all agree that it is mesoblastic and formed of connective-tissue of a myxomatous type, but centres round the origin and nature of the villus covering. I frankly range myself alongside of those who hold that this covering is fœtal and ectodermic, and that there is no endothelial boundary to the intervillous spaces. I cannot say, however, that the victory is won, and have a fear that perhaps those who hold strong opinions as to a probable maternal origin for part of the epithelium, at any rate, may take heart from Selenka's researches, and carry on their theory to a triumphant demonstration.

To those who would sneer at all this diversity of opinion on a mere, to them, academic question, I would point out that the nature of deciduoma malignum depends on the answer as to the nature of the villus-covering, and nothing that may throw light on malignant disease can be neglected. I may draw attention specially under this head to Bumm's and to Leopold's recent work, and to the very beautiful and accurate scheme of placental structure the latter has given in his atlas 'Uterus und Kind.'

On **Menstruation** we have fairly clear ideas. Opinion has rather swung round to Pflüger's views as to the causal relation between ovulation and menstruation. Heape's researches on the changes in the uteri of monkeys, a most exhaustive and extensive investigation, have supported markedly those who held that during menstruation a superficial denudation of the mucous membrane goes on. The exact nature of menstruation and its significance is still a matter for speculation, as may be seen from Beard's paper.

The Sectional Anatomy of the Pregnant, Parturient, and Puerperal Uterus.—The nineteenth century started with the great legacy of William Hunter's atlas of 'The Anatomy of the Human Gravid Uterus' (1774 and 1794), a work of its kind still unsurpassed. Obstetricians have, at the beginning of the twentieth century, in the many atlases of frozen sectional anatomy, an amount of material bearing on the subjects treated of in this paragraph, undreamt of by those who looked with wonder on the pioneer atlas of Braune—'Die Lage des Uterus und Fœtus am Ende der Schwangerschaft.' We have now almost every phase of pregnancy, every stage of ordinary labour, and almost every complication of labour represented with the most perfect fidelity. The effect of all this work has been to give an accuracy to our anatomical knowledge which has had far-reaching effects on our reading of the clinical facts of labour. Braune, by naming as the os internum what we now regard as the retraction-ring, started a controversy which lasted for years, but may be now regarded as settled in favour of the latter term, although Zweifel still adheres to Braune's view.

It would take too long even to enumerate the additions to our practical knowledge made by sectional anatomy. The nature and functions of the lower uterine segment; the division of the parturient genital tract into an active and passive portion; the canalization of the lower uterine segment, cervical canal, and pelvic floor during labour; the definitions of 'placenta prævia'; the anatomical site and main causation of ordinary uterine rupture; the mechanism of the expulsion of the fœtus; the mechanism of the third stage of labour; the various stages of uterine puerperal involution—these are only a few of the subjects where our knowledge has attained most marked fulness and accuracy. Most of the literature is German, but France, Italy, and Scotland have all contributed largely. Barbour's 'Anatomy of Labour' (1899), and his well-known atlas, give the results of all this work most fully.

The Mechanism of Labour.—No single book has influenced the knowledge of the mechanism of labour so much in this country as

Naegele's epitome (1822), translated by Rigby. It has been regarded with an almost superstitious reverence, and until recently its conclusions have never been called to account. If we take Naegele's statement merely as that of the relations between the fontanelles and bony pelvic canal, it is unsurpassed; but, in its terminology and description of the general relations of the fœtus and entire developed parturient canal, inaccurate in many respects. The terms 'flexion' and 'extension,' as descriptive of certain movements, are most misleading, but the difficulty is at present how to abandon them. One can only define them anew; but when the new definition is a contradiction of the accepted use of the term, the student's mystification may be imagined.

The clinical facts ascertained by Schroeder and Stratz, the measurements of the distance between pubes and fundus and between the advancing head and fundus, as well as a careful study of frozen sections, have given us a new mechanism of labour as yet too little taught, but destined to become a basis for the accurate teaching of the future. Our present teaching as to the mechanism of labour and its nomenclature is in the melting-pot, and how it may emerge it would be difficult to predict. The hard-worked student will certainly suffer most in this process.

The Pathology of Pregnancy. — This subject has been too long the stepdaughter of obstetrics, and, with the exception of extra-uterine gestation, has been neglected and misunderstood. It contains, however, some of the most important subjects for investigation in the whole question of midwifery, and recent work in it has been of supreme importance.

Our knowledge of EXTRA-UTERINE GESTATION has made marvellous progress since Parry's most valuable treatise (1876). We now know that tubal and ovarian pregnancies are the two great primary forms—the former in an overwhelming proportion—and that from some of the tubal forms most of the later stages of gestation arise. These later stages are almost invariably extra-peritoneal—*i.e.*, the development or alteration takes place in connective tissue. The criterion of the nature of an extra-uterine gestation is not the *locus* of the fœtus, but the attachment of the placenta. This has, as yet, never been shown attached anywhere else than extra-peritoneally, or in the tube or ovary.

I am aware that many eminent observers believe that an advanced gestation may be intra-peritoneal in its origin. If they mean by this that the early extra-uterine ovum has grafted its villi on a free peritoneal surface, they are making a statement which no one has as yet

sufficiently proved. I consider it highly improbable that this peritoneal grafting of the placenta can occur, but Nature's resources are so boundless, that after the recent demonstrations of early ovarian pregnancies one would be unwise to limit her powers.

The more recent work on tubal mole and tubal abortion has thrown great light on the subject of pelvic hæmatoma and hæmatocele; but this belongs more strictly to gynæcology.

Treatment in extra-uterine gestation is now either expectant or operative—by the knife—and all the hazardous procedures of poisonous injections and electrical currents are fortunately consigned to the huge sepulchre of dangerous treatment. May there be no resurrection.

ABORTION.—The pathology of abortion will afford a large field for the workers of our century, and these may take heart and encouragement from the great discovery of the remarkable relations between hydatid mole and deciduoma malignum. The nature and microscopical anatomy of this by no means uncommon condition—hydatid mole—has not received the attention it should have, and which it will in the future obtain. I have thrown out the suggestion that the absence of the fœtus withdraws the action of its thyroid from the chorion, and that we thus get a permanence of the early connective tissue, resulting in the curious vesicular and myxomatous condition of the chorion. Whether this be right or not, I am certain that an explanation of the cause of the large percentage of cases of deciduoma malignum preceded by hydatiginous degeneration of the chorion will go far to clear up the pressing question of the nature of malignant disease.

The fleshy mole has received some attention, and a certain amount of satisfactory explanation; but other forms, especially syphilitic abortion, greatly need elucidation.

These three instances prove the paramount importance of the pathology of pregnancy, and many future workers could have their hands full even in this limited field.

In ECLAMPSIA our knowledge is in a most unsatisfactory condition, and we have advanced little further in understanding the essential nature of this condition than obstetricians had done fifty years ago. We have relegated the kidney conditions first pointed out by Lever and Sir J. T. Simpson to a secondary place; we hold that some hypothetical irritant is at the root of the disturbance, but what it is we are unable to state; and our ignorance will continue until pathological chemistry comes to our help.

In the **Pathology of Labour** we begin our century with much

that is well known and carefully worked out. In placenta prævia and in accidental hæmorrhage we have—especially in the former—a rational explanation of the separation of the placenta, and sufficient resource in the well-known dilators and in version to cope with all cases. Saline transfusion, venous or submammary, affords the practitioner a ready means of repairing loss of blood, so that death from hæmorrhage in cases seen in time and watched should be rare. Our means of grappling with such cases are many, but dilatation, early version, and judicious and not too hurried extraction form one of the safest and surest means. The Irish School has made the startling proposal of the vaginal tamponade for accidental hæmorrhage, and several cases have shown successful results. Whether it will supplant the earlier method of rupture of the membranes, rapid dilatation and version, remains to be seen.

The more expectant plan of managing the **Third Stage of Labour**, and the generally-expressed opinion as to the inadvisability of the use of the Crédé method to separate the placenta, has led to better results in the management of this important stage. The attendant who merely guards the uterus with his hand, leaving that organ to separate the placenta, and who waits till this has been accomplished before he aids the expulsion by pressure when necessary, will have his reward in the entire and clean expulsion of placenta and membranes, and a great lessening of hæmorrhage and puerperal complications. One should never grudge thirty to forty minutes in a normal third stage.

Deformed Pelvis. — The reproach which Spiegelberg in his 'Text Book of Midwifery' (1878) levelled at the head of British obstetricians in regard to deformed pelvis has not been wiped out, and we have to expect from the new century a text-book which will supply as scientific an account of deformed pelvis as that given by Schauta or Tarnier. Our apathy in this matter is difficult to understand, as Sir James Simpson wrote a memorable paper on 'Turning as an Alternative for Craniotomy.' Matthews Duncan gave by far the best exposition in English as yet of the physics of the skeleton with special reference to the function of the sacrum; while several of the London School, Champneys, Herman, and Galabin, as well as Barbour of Edinburgh, have added to our knowledge. I have only to mention Goodell's famous paper on 'Labour in Narrow Pelves,' and some recent work from the younger school of obstetricians in America, and I have summed up the main Anglo-Saxon literature on this subject. This is a mere bagatelle to what Germany has done, and it is to be hoped that some British worker will soon fill up this

gap in our knowledge. There is much pathological material in our museums, an abundant clinical basis in our manufacturing towns, and no lack of able young investigators who only need their working expenses in such a research, and some of the guidance the experience of older and busier men can so well give.

For **Operative Treatment** obstetricians are now well equipped with many thoroughly tried procedures.

The outstanding facts on this head are the ever-widening use of axis-traction forceps, and its encroachment on the sphere of version; the limitations now laid on craniotomy, the resurrection of Sigault's operation,* and the increasing and successful practice of Cæsarean section.

Up till Tarnier's work on axis-traction it was considered a superfluity of meddlesomeness to tamper with the established models of long forceps, and Simpson's or some of its modifications, especially that of Barnes, held undisputed sway. For ease and accuracy of pull at all straits of the pelvic canal, Tarnier's forceps, or the forms based on his principles by Russell Simpson and Milne Murray, now hold the field. Anyone who has used the ordinary long and the axis-traction forceps must be struck with the advantages of the latter, especially in symmetrically deformed pelves. It should be remembered that the fixation screw needs careful attention, and careless screwing of it up may seriously damage the fœtal head.

The use of axis-traction forceps has revived the old controversy on forceps and version in the flat or rickety flat pelvis. I still hold that in multiparæ with a conjugate a little above $3\frac{1}{2}$ inches, and room in the transverse, the best treatment is version, but in primiparæ, with the same conditions forceps compete strongly.

The resurrection of Sigault's operation—thanks mainly to the persistent advocacy of the Italian School—came as a surprise to those of us who held, like Winckel, that this operation was not only dead, but should be buried conclusively. It cannot be said to have quite rehabilitated its lost reputation, but the successes in Paris and Germany, and the recent cases of subcutaneous symphysotomy by Herman and Buist in this country, render it necessary that a fair trial of it should be given.

Cæsarean Section has now in suitable cases a firmly established place, and has fortunately deprived craniotomy of many of its indications. The time may soon come when, so far as the operator is

* The usual terms 'symphysiotomy' and 'symphyseotomy' are both wrong, and 'symphysotomy' is quite accurate and euphonious.

concerned, craniotomy will only be advised in cases where the fœtus is dead. Before Porro's memorable case, Cæsarean section was looked at askance, and the actual results of this operation must have been appalling when we remember the enthusiasm with which the successes of the new procedure (new in practice, as Blundell had only suggested it) were received.

Next in advance came the valuable work of Sänger of Prague as to the best methods of uterine suture, so that the modern conservative Cæsarean section—thanks to his work, to asepsis, and to early operating—has lowered its mortality to 10 per cent. and less in the hands of Leopold, while recently Sinclair of Manchester has had twelve consecutive cases without a death. In Glasgow also Cæsarean section has given good results. The high mortality in the old Porro operation was due to the extraperitoneal treatment of the pedicle, but it may be now performed much more successfully when the stump is treated retroperitoneally, as in fibroid operations, or, when necessary, a panhysterectomy may be done.

In the treatment of fibroids complicated by pregnancy, the newer methods are giving brilliant results, as may be seen from the recent papers of Sutton, and the discussion at the London Obstetrical Society.

We thus have now a series of operative procedures which conserve the life of both mother and child. Sigault's operations will probably rob craniotomy of its victims in conjugates of 7 to 8 centimetres, while in the lower grades of deformity Cæsarean section steps in to save those beyond the help of symphysotomy, and so the new century begins hopefully by wiping away a great reproach from obstetrics—the barbarism of craniotomy.

This great progress is practically due to anæsthesia, asepsis, and improved technique, and for this we have to give the credit to Simpson, Lister, and the many gynæcologists who have perfected the operative details of abdominal section.

Puerperal Septicæmia.—Semmelweiss, Pasteur, Lister, Koch, and many other scientific workers in bacteriology whom it would be impossible to enumerate, have shown us that puerperal septicæmia (using this in a general sense) is due to the invasion of the tissues of the puerperal woman by a pyogenic organism usually; that the disease is heterogenetic, and is preventible by antiseptic and aseptic measures. Despite these clearly-ascertained facts, which should lead to a perfectly definite and successful prophylaxis, the deaths from puerperal septicæmia have not, as Boxall and Cullingworth have shown, diminished in this country, but in some years actually

increased, notably in 1881 to 1888, and in 1892 and 1893 (England and Wales).

This is a most serious question, and requires full investigation of the possible defects in teaching, and of any imperfect antiseptic precautions in practice. We have inherited from the great names given the theoretical knowledge of the cause of the scourge of parturient women; it is the duty of all, in the time to come, to see that that knowledge is acted up to practically in all its necessary details, and that the gaps in its pathology and treatment still existing are filled up.

In summing up the general impression this imperfect Appreciation of Obstetrics gives, we may say that we have pride in the present status of our subject, and unbounded hope for the future. The progress in the latter half of the nineteenth century has been most striking. A loyal and determined effort on the part of all obstetric teachers to utilize with unbiassed minds their opportunities and influence in the furtherance of scientific research, aided by the enlightened clinical work of the practitioner, might make the new century one of the greatest in the history of obstetrics.

CASE OF TUBAL PREGNANCY OF SIX MONTHS' DEVELOPMENT WITHOUT RUPTURE OF THE TUBE.

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THE patient, who was ultimately discovered to be the subject of an unusual form of extra-uterine gestation, presented herself in the ordinary course as an out-patient at the Manchester Southern Hospital for Women and Children. After superficial examination she was at once admitted into the hospital.

CLINICAL HISTORY.—Mrs. M. T., of Openshaw, Manchester, admitted January 14, 1901, aged twenty-five years, married seventeen months, no children, slight delicate build, but not unhealthy-looking. Her last period before menstruation was interrupted by the present ailment occurred on December 15, 1899. Menstruation has been regular again for the last three months.

At the time of admission, patient complained of pain in the left iliac region, with frequent and uncomfortable micturition; and these were the only symptoms she mentioned. She suffered from morning sickness in March, April and May, 1900, and her abdomen increased in size. She had not then any pain worth mentioning. The abdominal swelling was at its largest early in June, and her breasts then filled with milk. The amount of milk was remarkable; it flowed freely from the breasts, so that she had to make an arrangement with cloths to soak it up and diminish the inconvenience caused by wetting. Later on the amount greatly decreased, but she was still wearing her special dressing at the time of admission to the hospital. She stated that there was no sudden change in the size of the breasts or in the flow of milk either during increase or decrease.

The abdominal swelling began to diminish in the last week of July or beginning of August, when she thought she was about seven months pregnant, and the rate of decrease for a time was described as 'shocking in its rapidity.' The swelling then remained about the same size until she presented herself for examination at the hospital in January.

In the beginning of August she had pains which 'drew her to the floor.' These continued for two days. She got pills from the doctor to relieve them, and she stayed in bed for three days. As

the pain returned in the second week of September she again consulted the doctor, who advised her to go to bed once more. Dr. Cluff, who has kindly supplied me with important information about the case, writes that she was complaining of a 'show' and pain similar to that which she had experienced on the previous occasion; the pain from being intermittent became continuous, and at times it was acute; a tumour about the size of a four months' pregnancy was found on the left side, and also what seemed to be the normal uterus in its normal position; the breasts were also enlarged, and, considering all the facts of the case, extra-uterine pregnancy was diagnosed. The patient was advised to go to a hospital without delay, but declined to do so. Accordingly a consultation was held at a time when a *locum tenens* was in charge, and the consultant appears to have diagnosed fibroid tumour.

The patient says that the hæmorrhage continued for four weeks; it was continuous, but never profuse; sometimes a piece of skin came away with the blood. The hæmorrhage ceased in the beginning of October; then menstruation occurred in due course, and has been regular ever since.

It was in the beginning of December that the pain in the lumbar region and the bladder symptoms came on. The patient has remained in bed almost constantly since then, and at last she resolved to follow the doctor's advice as to hospital treatment.

At the time of the first admission it was noted that there was an abdominal tumour rising to the umbilicus. The tumour was so situated that it pressed the uterus downwards and backwards. The uterus was not obviously enlarged, but the vagina was darker than normal, a change attributed to pressure. There was milk in the breasts. The urine contained a trace of albumin (catheter specimen), but no sugar. Sp. gr. 1,024. The temperature was subnormal.

The case was diagnosed as *Abdominal Pregnancy*, the death of the fœtus having occurred in June or July of the previous year. Against this diagnosis were the points that in examination under anæsthesia no fœtal parts could be made out, and the tumour was more movable than was to be expected in abdominal pregnancy. It was ascertained that the uterus was normal in size as measured by the sound; the vaginal portion was rather hard and small. The patient consented to operation, but had to be sent home temporarily owing to an outbreak of infectious disease in the children's department.

Operation.—Mrs. T. was admitted again on February 8, and the operation was performed next day. On examination previous to

operation it was found that the tumour had considerably decreased in size, and it seemed to be harder than it had been three weeks before.

An incision was made of sufficient length to permit of the tumour being lifted out without breaking it up, as there was evidently little fluid to drain off. When the mass was exposed it was seen to be of a dirty brownish-yellow colour, and gave the impression of being a dermoid tumour of the ovary which had undergone some chronic inflammatory process, causing thickening of the cyst wall. On passing the hand round the tumour, remains of peritonitis were found in the form of numerous thin bands and strings all round, which could be readily broken down. The tumour felt very firm, and was somewhat irregular in form, but not at all cystic. Several attempts were made to bring the mass through the abdominal wound, but when completely raised out of the pelvis it was too large for the incision. Instead of enlarging the wound it was resolved to diminish the size of the mass, and the tumour was so manipulated as to prevent extravasation of its contents into the peritoneal cavity. The capsule was then torn through, and as only a fluid ounce or so of thick dirty-looking matter like the thicker fluid contents of a dermoid tumour escaped, a solid portion was laid hold of and dragged out. This was discovered to be the lower extremity of a fœtus, greatly shrunken and macerated. By enlarging the opening in the cyst the other leg and the breech could be extracted, and the whole mass was then readily drawn through the abdominal wound. The relations of the tumour were ascertained before tying the pedicle. The tumour was the left Fallopian tube, which became suddenly distended about three-quarters to half an inch from the cornu of the uterus. In gathering together the structures which were to form the pedicle before transfixing, the apparently normal tube could be distinctly felt between the finger and thumb. After tying the pedicle, as in ordinary ovariotomy, the whole mass was lifted away. There was no fluid nor any débris of any kind in the pelvis. Neither flushing nor drainage was required.

The patient made an uninterrupted recovery, and has been quite well since her discharge from the hospital on March 9.

Pathology.—The tumour, with fœtus still undisturbed, was removed for examination to the Obstetric Department of Owens College.

It was quite evident, even at the time of operation, that the pregnancy was tubal, and that the tube had not ruptured. The amniotic fluid had been completely absorbed, leaving only a very small quantity of a thick dark purulent substance to represent it.

The fœtus had all the development of a six months' pregnancy, but it was small in size, and the parts were all crowded together by the contraction of the tube, of which the muscular wall was enormously developed. The amnion, which was separated in the course of examination of the specimen from the surface of the cavity near the opening made in operating, was tough and strong, like the membrane at the full term of pregnancy.

The cut contracted end of the undilated portion of the tube near the cornu of the uterus was distinctly recognisable as a projection on the surface of the tube. The distal end of the tube with the fimbriæ was unchanged.

For the illustrations I am deeply indebted to Dr. R. S. Nichol, then House-Surgeon of the Southern Hospital, and to Dr. W. E. Fothergill. The former made the water-colour drawings Figs. I. and II., which exactly depicted the objects at the time they were drawn. Unfortunately, owing to illness, Dr. Nichol was unable to take the matter in hand until the specimen had been in formalin for some days and the tube had considerably shrunk. Dr. Fothergill's drawings show admirably the microscopic appearances of the maternal and fœtal structures, and their relations to one another at points selected for demonstration purposes.

Fig. I. shows the tumour with the fœtus partly extracted. This was the condition in which the mass was removed from the abdomen by the operation.

Fig. II. shows the portion of the tube forming the tumour. It is greatly contracted as compared with its condition at the time of operation. A considerable incision had to be made, extending the opening, before the fœtal shoulders and head could be extracted.

Fig. III. shows a portion of the wall of the cyst selected to show the distal section of the tube and the fœtal structures attached to the cystic portion from the strong wall of which the tube appears to issue. Each structure is sufficiently indicated by the terms in the margin.

Fig. IV. shows a section of the proximal end of the tube. This figure is slightly diagrammatic, inasmuch as the lumen is shown opened out to an extent not seen in the microscopic section. The epithelium is distinct enough everywhere sound in the section, but it is atrophic and ill-developed as if from the pressure of the greatly hypertrophied muscular element.

Fig. V. is a section of the cyst wall at a point of medium thickness, showing the relation of the placenta to the tube, and the changes which the maternal portion—the tube wall—has undergone.

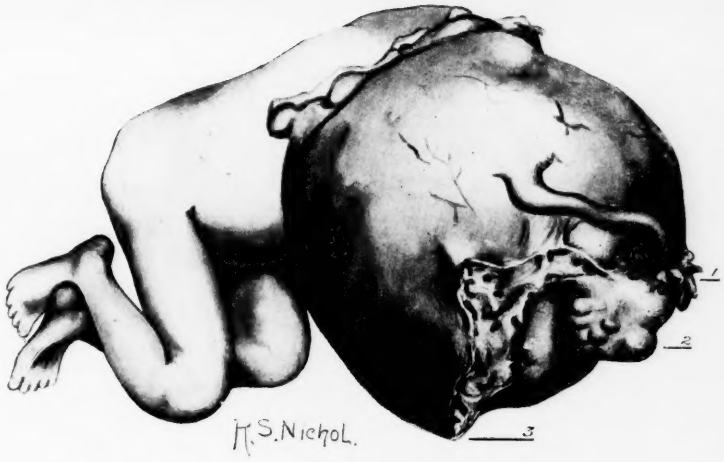

FIG. I.—TUMOUR AND FŒTUS AS REMOVED BY OPERATION.
1, Ostium abdominale ; 2, Normal ovary ; 3, Fallopian tube near left corner of uterus.

FIG. II.
1, Strong muscular wall of tube ; 2, Thin wall of tube ; 3, Membranes hanging out.

To face p. 64.

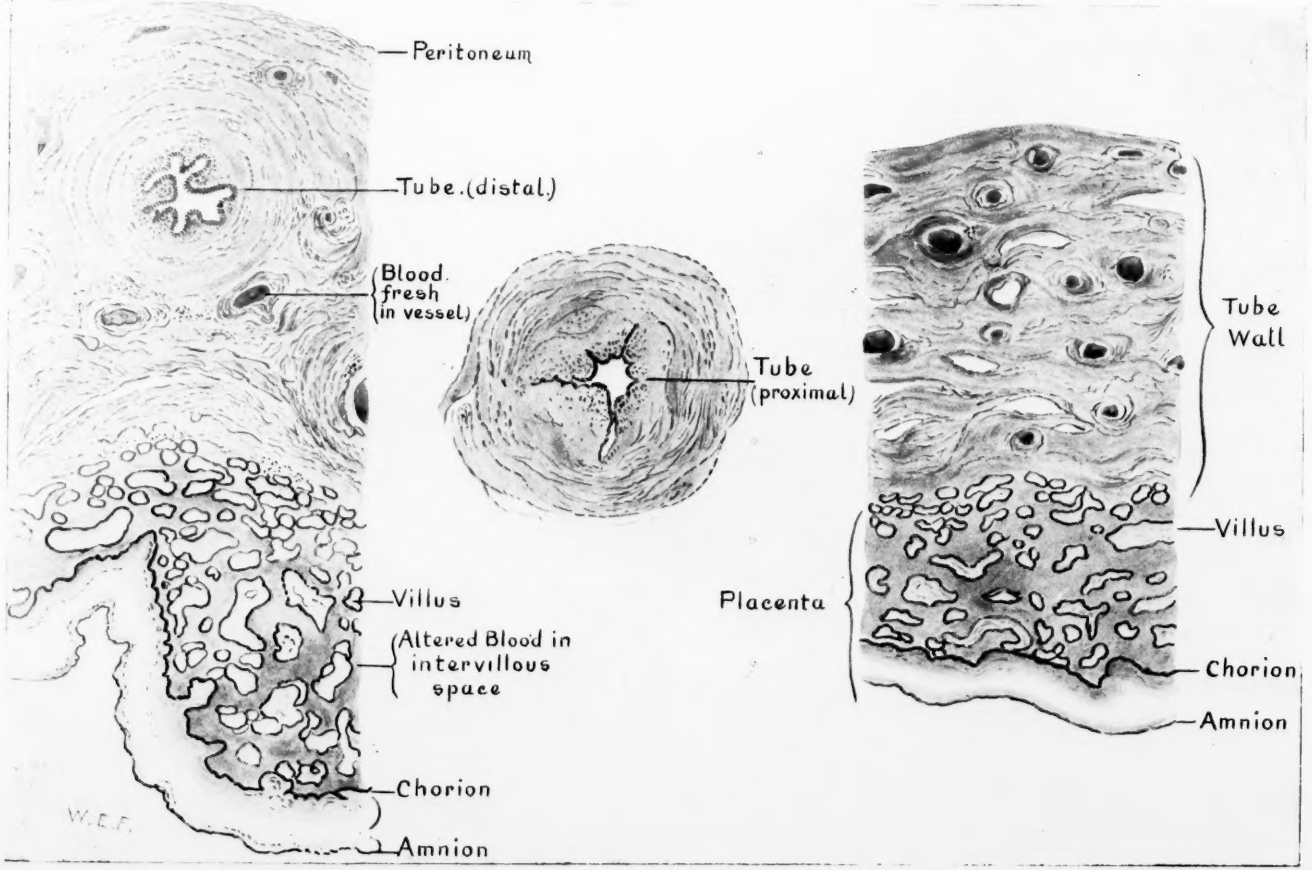

FIG. III. FIG. IV. FIG. V.

The individual structures are sufficiently indicated by the words in the margin.

The microscopic drawings show the parts eight times the natural size.

REMARKS.—In the history of the case there are some facts of interest from the standpoints of physiology and diagnosis.

What is the meaning of the morning sickness? That it did exist there appears to be no room for doubt. The patient, an unusually intelligent woman, described it graphically, and knew the time when it began and when it passed away. She mentioned it without being questioned on the point to the house-surgeon who took the first notes of the case, and subsequently she described it among the symptoms in my first interview with her. It is to be remembered also that it was her first pregnancy. How does this fact fit in with our theories of the causes of the morning sickness of pregnancy?

It was obvious from an early stage that the patient was pregnant, and by the time she was examined by Dr. Cluff extra-uterine pregnancy seemed the only possible diagnosis.

With regard to milk in the breasts there is a point of great physiological interest and diagnostic value. The presence of milk in the breasts may justify the presumption that a patient is pregnant; the fact that the breasts are full and overflowing with milk proves that the patient has been actually or potentially delivered at an advanced stage of pregnancy. The death of the well-developed fœtus *in utero*, or, as was erroneously assumed in this case, in the abdomen, or, as actually was the fact in this extremely exceptional case, in the tube, is followed by the rising of the milk as if the woman had been delivered prematurely without any other abnormality than interruption of pregnancy.

The prolonged slight loss of blood containing shreds was clearly the belated shedding of the decidua. The continuous pain was in all probability a symptom of the peritonitis which was demonstrated in the process of operation to have occurred at some stage of the illness preceding the few weeks of comparative comfort before the patient was first examined at the hospital.

It was pressure on the bladder and the sacral nerves which produced the symptoms which compelled the patient to seek relief.

The case was diagnosed as abdominal pregnancy, and operated on as such, in spite of two points which have already been mentioned. When the patient was examined while conscious the tumour appeared to be fixed partly in the pelvis, where it pressed down the uterus,

and partly in the abdomen, where it was situated slightly to the left side, and no fœtal structure could be made out, although the patient was far from being stout. She was in fact rather thin, but not emaciated. In the course of this examination, and without more ado, the patient was put under an anæsthetic, and the examination was continued. The mass of the tumour could then be raised up out of the pelvis, though with an embarrassed movement to some extent. This was rather surprising, as the diagnosis of fibromyoma was out of the question. The idea of tubal pregnancy naturally occurred, but was set aside as too improbable. Even under the anæsthetic, with the abdominal muscles completely relaxed, no portion of fœtus could yet be made out, but though this fact was also disconcerting and raised a doubt, it was assumed to result from the drying up of the amniotic fluid and the deposit of a thick layer of exudation substance round the fœtus in the abdomen.

The patient was seen and examined in November this year, and it was ascertained that she was then in the third month of pregnancy. Owing to the asymmetrical form of the tumour a suspicion arose that the pregnancy might be tubal on the right side. Examination under anæsthesia, per rectum as well as bimanually, revealed that the pregnancy was uterine, and it was only the absence of the left tube which gave the impression of want of symmetry.

FŒTATION IN A RUDIMENTARY HORN OF A BICORNUTE UTERUS.

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I was asked by Dr. McAulay on October 7, 1901, to see a young married woman who was puzzled about her condition, as she had expected her confinement in July.

Mrs. B., aged twenty-four, stated that in 1898 she was married, and had an abortion six weeks afterwards. In 1899 she miscarried in the fifth month. She ceased to menstruate in October, 1900, and believed herself pregnant.

She states that she had uterine pains in April, and that a large mass about the size of her hand was expelled from the vagina. In July, when she expected her confinement, she had slight labour pains; but they passed away, and since then the swelling in her abdomen has gradually diminished to its present size. She has had no menstrual discharge for twelve months, and there is milk in the breasts.

On inspection, a large tumour was seen occupying the right side of the abdomen, and it had quite the appearance of a seven months' pregnancy, only that it was not in the median line.

Palpation revealed a somewhat firm tumour, with more resistance at the upper part, and giving to the hand the feeling that that part corresponded to a fœtal head. Upon vaginal examination, the cervix and uterus were found displaced backwards and to the left side by a large swelling occupying the right broad ligament.

The case was diagnosed as one of ectopic pregnancy, and this opinion was supported by my assistants, Drs. Munro Kerr and McLennan, as well as by my friend Dr. J. Macpherson Lawrie, of Weymouth, who was on a visit to Glasgow at the time.

It was resolved to open the abdomen instead of operating it *per vaginam*, and it is fortunate this was done, or the condition of the parts would never have been detected.

On October 22, upon opening into the peritoneal cavity, the right Fallopian tube presented, but was found quite normal. Further exploration revealed the fact that the case was one of pregnancy in

a double uterus. The anterior wall was incised, and a well-matured but macerated fœtus was removed with its placenta. The funis was found adherent to the inner surface of the organ. I then asked Dr. McLennan to insert his fingers into the vagina and press upwards between the two halves of the uterus, whilst I passed my fingers downwards from above. We then distinctly made out that the right half had no apparent connection with the left, and also,

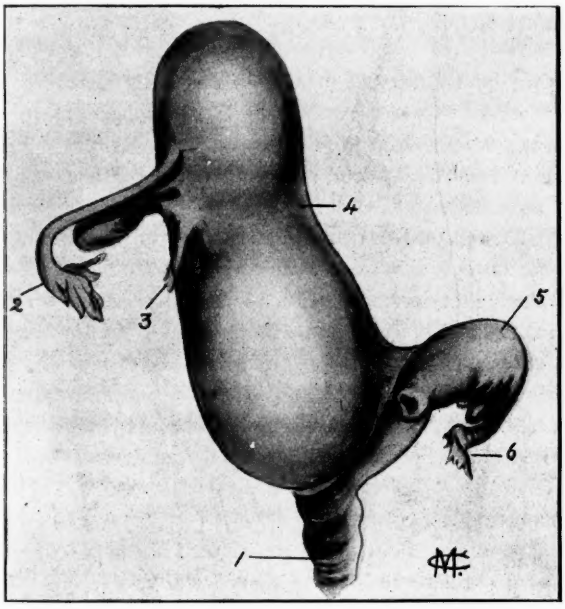

FIG. 1.
1, Vagina; 2, Right Fallopian tube; 3, Right round ligament; 4, Sac; 5, Uterus; 6, Left Fallopian tube.

on inspection, found that each half had a single Fallopian tube and ovary (Fig. 1).

When I found that the distended cervical portion of the right half had no opening into the vagina, and that its tissue was somewhat friable, I thought it would be safer for the patient not to enucleate the sac, but to close its upper uterine portion, as in Cæsarean section, whilst I secured the lips of the wound in the cervical portion to the lower angle of the external wound, and plugged the lower portion of the sac with iodoform gauze, which was removed after three days.

To prevent any accumulation of secretion in the sac, the vagina was packed with gauze, which was changed at intervals of a few

days. The sac continued to discharge by the aperture at the lower margin of the external wound, but no odour was at any time detected, nor was there any vaginal discharge at any time.

The Fallopian tube was ligated at two points and divided at the time of the operation.

The patient made a good recovery. At the end of three weeks the sound passed 2½ inches into the left horn, and no channel of communication could be made out with the right side.

The only two other cases on record at all resembling this one were reported by Drs. Galabin and Targett in the *London Obstetrical Transactions* for 1895 and 1900 respectively.

Dr. Galabin's patient was twenty-five years of age, and became pregnant soon after marriage. When four months pregnant she complained of an illness described as 'congestion of liver,' and vomited some blood. She had labour pains at nine months, but had no discharge till two months later, when there was a discharge lasting only one day. A month afterwards she had a normal period. In this case also the uterus was found behind the tumour. Palpation revealed a globular swelling, with fluctuation and fluid thrill as met with in an ovarian cyst.

Abdominal section was performed, and after much trouble, on account of adhesions, the tumour was removed unopened. The specimen showed the fœtus lying much doubled up in a thick-walled sac formed from the left imperforate horn of a double uterus.

Dr. Targett's case was that of a primipara, aged twenty-nine, who married in May, 1899. Menstruation ceased in June, and she expected her confinement in March. In November, 1899, she had pain in the left iliac region. In April, 1900, she had abdominal pain, but no discharge. In May, 1900, she had a flooding; it was not severe, but lasted nearly a month. The swelling from this time diminished in size, and no fœtal movements were felt after April. The abdominal swelling had the appearance of an eighth-month pregnancy, and resembled a well-defined tumour, somewhat more prominent on the right side. On vaginal examination the cervix was found directed backwards, neither softened nor dilated, and connected with a round body that was pushed to the left side by the tumour. The sound passed 3 inches into this smaller body.

In September, 1900, a median incision was made, and the swelling exposed. Upon incision some liquor amnii escaped, and a fœtus, somewhat macerated, was extracted; but the placenta was so adherent that it had to be removed with the sac, which was the right imperforate horn of a double uterus. It was connected with

that on the left side by a thick band of tissue. Each half had a Fallopian tube and an ovary. No trace of a uterine canal could be found in the cut surface of the pedicle.

Pregnancy either in one horn of a double uterus, or simultaneous pregnancy in both horns with vaginal communication, have frequently been recorded.

Curiously enough, in several of these the abnormal condition had not been detected in the earlier pregnancies. In nearly all of them the abnormality gave rise to obstruction, either through the vaginal septum, retrodisplacement of the non-gravid horn, deviation of the pregnant one, or delivery at different periods (superfœtation).

In all of them, however, the division of the septum, the use of the forceps, or version, was sufficient to effect safe delivery.

Cases of unilateral atresia in the double uterus, in which menstrual products have been retained, have also been reported; but so far as I have been able to ascertain the three cases of pregnancy in an imperforate horn are unique in having no perceptible communication with the vagina.

The point of interest in these cases is as to the channel through which the women became pregnant. To my mind only two ways present themselves. First, by some small channel or tubule in the cervix, which afterwards became obliterated, or by one Fallopian tube grasping the other, and thus forming a continuous channel through which the sperm could reach the imperforate sac.

REFERENCES.

London Obstet. Trans., 1895, pp. 225 and 301.
Lancet, 1871, vol. ii., p. 188.
'Path. Anatom.,' Syd. Soc., vol. ii., p. 277.
Ibid., 1900, p. 276.

CRITICAL ESSAY.

ANÆSTHESIA BY SUBARACHNOID INJECTIONS OF COCAINE IN THE LUMBAR REGION: ITS USE IN GYNÆCOLOGY AND OBSTETRICS.

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The plan of inducing anæsthesia by the injection of a solution of cocaine into the subarachnoid space has been extensively adopted during the last two years, more especially on the Continent and in America. The literature of the subject is very extensive, and upwards of 1,500 cases have been operated upon by this method. The idea of producing anæsthesia by injections of cocaine into the spinal region undoubtedly originated with Dr. Leonard Corning, of New York, in the year 1885.* He carried out experiments on dogs, and also on the human being, by injecting solutions of cocaine between the laminæ of the lower dorsal vertebræ. He obtained definite analgesia, but in his early observations Dr. Corning did not appreciate the importance of injecting the solution directly into the subarachnoid space. He used a trocar or needle with syringe attached, and thus he was not able to recognise the presence of cerebro-spinal fluid, which is the only certain test that the needle has entered the subarachnoid cavity. In a recent paper, Dr. Corning reviews his early work on the subject, and lays special stress on the care which is necessary to obtain definite results, and to avoid the possible dangers of the method.†

Quincke‡ of Kiel in 1890 first used lumbar puncture as a diagnostic and therapeutic measure in cases of organic disease of the central nervous system, and since then this method has been widely adopted as a means of draining away cerebro-spinal fluid for the relief of pressure.

* *New York Medical Journal*, 1885, vol. xlii., p. 483.
† *Medical Record*, 1900, vol. lviii., pp. 601-603.
‡ *Berlin. Klin. Woch.*, No. 38, September 21, 1891.

PHYSIOLOGICAL ACTION OF COCAINE.—The drug has a most powerful toxic effect on the central nervous system, acting as a protoplasmic poison. Thus, 3 drops of a 10 per cent. solution applied to the medulla of a dog caused immediate respiratory paralysis and death.* Sicard in 1899† made numerous investigations in animals on the effects of saline solution, and also of cocaine injected into the subarachnoid space, and later used it as a method of treating the lightning pains of locomotor ataxia, with temporary relief. It was at first thought possible that the analgesia following spinal injection was the result of the action of the fluid on the nerve centres, or of increase of pressure in the subarachnoid space. Numerous researches, however, have shown that the analgesia is due to the specific action of the drug itself.‡

Tuffier and Hallion§ have made experiments on animals to decide whether the cocaine acts on the spinal cord or on the nerve trunks. They have shown that the effects are almost exclusively confined to the nerve roots, and that the anæsthesia does not depend to any appreciable extent on the impregnation of the cord itself by the cocaine. It seems probable that the cocaine solution injected into the lumbar subarachnoid space acts on the posterior roots and nerve endings through lymphatic absorption, rather than through the blood circulation in the cord. It has been shown experimentally‖ that strychnine and ferrocyanate of sodium injected into the subarachnoid space pass directly into the nerve tissues through the lymph channels. This method of absorption may explain the extremely rapid action of cocaine. In some cases the cerebro-spinal fluid around the cord is small in amount, and hence the cocaine solution is not much diluted when it comes in relation to the nerve structures, and this accounts for the toxic effects on the nervous system so well marked in these cases.

Ravaut and Aubourg¶ have recently studied the changes in the cerebro-spinal fluid after spinal cocainization. They have made a second lumbar puncture some hours after the injection, and evacuated some of the fluid with the object of diminishing tension and of relieving the headache which is often so severe. This second puncture usually relieved the pain, and it was observed that the

* Franck, *Archiv. de Physiologie*, vol. iv., 5th series, 1892.
† Société de Biologie, May 20, 1899.
‡ Nicoletti, Sicard, Tuffier, International Congress of Medicine, Paris, 1900.
§ Société de Biologie, November 3, 1900.
‖ Levandowsky, *Zeitschrift für Klin. Medicin*, vol. xi., 1900.
¶ *Gazette Hebdom. de Médecine et de Chirurgie*, June 27, 1901.

more intense the headache, the greater was the pressure of the fluid in the subarachnoid space. In these cases the fluid came out in jets, and was turbid, whereas if the headache were only slight the liquid was clear, and escaped drop by drop only. The cerebro-spinal fluid was found microscopically to contain many polynuclear leucocytes which formed a distinct deposit, and in some cases a fibrinous coagulum was present. The quantity of cellular elements was in direct proportion to the severity of the headache. Twenty-one cases were examined some hours after the injection; once only was the fluid found to be normal. Repeated puncture at the end of three or four days showed that the liquid was now clear, and contained a small number of mononuclear leucocytes. At the end of eight to twenty days the fluid had become normal. These changes in the fluid are precisely those met with in cases of acute meningitis which recover. The cause of this reaction is certainly not any form of infection, nor can it be the result of the injection of the distilled water in which the cocaine is dissolved, as a similar reaction is seen if cerebro-spinal fluid is used as the medium. The cocaine itself seems to be the essential factor, which can be compared to that of a toxin. This explains all the inflammatory and exudative phenomena observed, and clinically the headache is the principal symptom. These changes in the fluid are always merely temporary, and 'do not justify the fears which have been entertained regarding the danger of spinal anæsthesia.' It is, however, a striking fact that the inflammatory reaction is always present, and if organisms were introduced by any mischance, serious meningeal symptoms would certainly ensue.

Bier of Kiel,* in April, 1899, was the first to demonstrate the efficacy of injection of cocaine solution into the lumbar subarachnoid space in producing surgical analgesia. He related numerous operations performed by him on the lower half of the body under its influence between August, 1898, and April, 1899. He injected 2 centimetres of a 1 per cent. solution of cocaine, and never exceeded 15 milligrammes of cocaine ($\frac{1}{5}$ grain). Tuffier of Paris, who has done so much to bring this method forward, read his first paper in November, 1899, and since then he has made numerous communications on the subject.† As the result of numerous researches, he has elaborated a technique which has been mainly followed by other

* *Deutsche Zeitschrift für Chirurgie*, 1899, vol. li., p. 361.

† *Semaine Médicale*, May 16, 1900, p. 167; *ibid.*, December 12, 1900, p. 429; Analgésie Chirurgicale par voie Rachidienne, 1901.

operators. The details of the method of Tuffier are briefly as follows: The injection is made between the laminæ of the fourth and fifth lumbar vertebræ. For this purpose a needle sufficiently long and firm to penetrate the tissues is required. Tuffier's needle is 4 inches long, and is best made of platinum with an iridium point. The point of the needle must be short, to avoid injury to nerve structures. The skin of the lower dorsal and lumbar region is made thoroughly aseptic. The patient is placed in a sitting posture, with the back well arched forwards. In this position the maximum amount of separation between the laminæ of the vertebræ is obtained. The spine of the fourth lumbar vertebra is now sought for and clearly identified. This is usually easy to do, but in stout patients, or if the spinous process is not well developed, a line joining the highest points of the iliac crests, which crosses the level of the fourth lumbar spine, may be adopted as a guide, and will be found to be reliable. The needle is now inserted 1 centimetre below and outside the spinous process, and directed vertically downwards and slightly inwards. It will enter the interval between the laminæ of the fourth and fifth lumbar vertebræ, and penetrate the subarachnoid space, as is shown by the escape of clear cerebro-spinal fluid through the needle. An ordinary Pravaz syringe is now attached to the needle, and 1 centimetre of a 2 per cent. solution of hydrochlorate of cocaine ($\frac{1}{3}$ grain) is very slowly injected. The needle is now withdrawn, and the minute puncture sealed by collodion. The strictest antiseptic precautions must be observed, the syringe and needle being boiled immediately before use. The cocaine may be sterilized by boiling just before the injection is made. Tuffier, however, always uses capsules specially prepared by repeated sterilization. It is essential that the cocaine solution be freshly made, as otherwise there is risk of its becoming inert.

This small operation is usually carried out without causing any pain to the patient, but difficulty may arise from several factors:

1. The needle may impinge on the bony lamina, or in cases of deformity of the vertebræ or ankylosis it may be impossible to enter the subarachnoid space. Under these circumstances the needle should be withdrawn and a fresh puncture made.

2. The needle may be apparently in the subarachnoid space, but as yet no fluid appears. This may be due to the point being entangled in the membranes, or the needle may have penetrated too deeply. A slight movement of rotation or withdrawal is usually sufficient to cause the fluid to run freely.

3. Blood may appear at the end of the needle, due to injury to

a vein. The needle must then be withdrawn and a fresh puncture made.

The analgesia commences almost immediately, and is usually complete in five to ten minutes. It may, however, be well marked two minutes after the injection, or fifteen to twenty minutes may be required in rare cases. The extent of the analgesia shows great variation. In many cases it reaches as high as the fourth rib, or even to the upper extremity.* It may be relied upon up to the level of the umbilicus, and usually there is complete cutaneous anæsthesia up to the ensiform cartilage. The duration of the analgesia is also somewhat uncertain. Usually it continues for an hour or a little more. It may, however, last for thirty minutes only, or up to three and a half hours. These irregularities in the extent, degree, and duration of the analgesia do not depend definitely on the dose of cocaine given, but appear to arise from personal idiosyncrasy. Some patients, indeed, appear to be insensitive to the drug unless given in large doses.

A valuable series of observations on the effects of cocaine injections have been recently made by Professor Pitres and Dr. Abadie,† based upon the careful examination of fifty cases. The conclusions arrived at are, shortly, as follows: 1. *Sensory Phenomena.* — The analgesia is not due to the direct effect of cocaine on the spinal cord, but to its influence on the posterior nerve roots lying in the cauda equina. This explains the great rapidity with which the analgesia may be induced in some cases. The analgesia is progressive, commencing with a slight diminution of sensation, and continuing up to complete insensibility to pain. It may commence in the thighs or perineum, or in the feet, or in diffuse areas of anæsthesia over the lower half of the body. The cutaneous sensibility to pain first disappears, closely followed by the abolition of the sense of temperature and pressure. The application of heat or cold only calls forth the sense of contact, which in some cases even disappears entirely. Tickling of the soles of the feet may be perceived, although the usual reflex is not called forth. As the effects of the cocaine pass away, sensibility to touch reappears, then the sense of pressure and temperature, and lastly the sensitiveness to pain. The sensation in the deeper tissues, muscle, bone, joints, etc., is abolished in direct proportion to the intensity of the cutaneous analgesia. Deep visceral sensibility, such as that of the peritoneum,

* Fowler, *Philadelphia Medical Journal*, November 3, 1900.

† *Archiv. de Névrologie*, October, 1901.

is never completely abolished, though much diminished. Relaxation of the sphincters is not observed with moderate doses of cocaine, though gas may escape from the anus during sickness.

2. *Motor Phenomena.*—A few minutes after the injection slight tremors, cramps, and fibrillary contractions are noticed in the lower limbs in about two-thirds of the cases. There is, however, no motor paralysis, and all voluntary movements can be executed, although more slowly than under normal conditions.

3. *Vaso-Motor Phenomena.*—The skin over the analgesic area does not show any alteration in colour or appearance; if a puncture is made, little blood escapes, showing the vaso-constrictor effects of the drug.

4. *Secretory Phenomena.*—In a large proportion of cases profuse sweating, with flushing of the face and upper extremities, is observed, whilst the analgesic areas remain dry and pale.

Pitres and Abadie have also made observations on fifteen cases of simple lumbar puncture, with the withdrawal of some cerebro-spinal fluid, varying from 5 to 30 c.c., but without the injection of cocaine. In these cases no epileptiform movements or contractures were observed, but the reflexes were diminished, or even abolished. Voluntary movements were unaffected.

Condition of the Patient during Analgesia.—A few minutes after the injection the patient has a feeling of 'malaise,' with some respiratory anxiety and weight at the epigastrium. Many patients also have sensations of heat and complain of thirst. These symptoms usually subside in fifteen to twenty minutes. Nausea occurs in 30 per cent. of cases, often associated with facial pallor. In a considerable proportion it is succeeded by vomiting of glairy mucus. This usually takes place within ten or fifteen minutes of the injection, and then ceases; exceptionally it may recur during the operation.

The pulse is slightly quickened, and the tension is lowered. In some cases it becomes small and frequent, often just preceding the nausea or sickness, and rapidly becomes normal after this has passed off. There is often slight respiratory anxiety, and if large doses of cocaine are used serious difficulty, or even danger, may arise from this cause.

Condition of the Patient after Analgesia.—The patient usually feels very comfortable; the pulse and temperature are normal. Slight sickness may continue, but in many cases this is entirely absent. Tuffier states that he has never seen serious sickness. Headache, which may be very severe, comes on six to eight hours after the

injection. It is present in 90 per cent. of cases. In rare instances (2 per cent., Tuffier) it may persist for two, three, or four days, and in a few instances a 'late' headache has come on three or four days after the operation. The cause of the headache is not yet clearly elucidated. Tuffier considers that it depends on several factors. It follows simple lumbar puncture without any injection of cocaine. It is also aggravated if much cerebro-spinal fluid is drained away. Bier in a personal experiment lost a considerable quantity of fluid, and suffered severely for some days from headache and other nervous symptoms. The experiments of Ravaut and Aubourg would appear to show that the headache is due to increase of cerebro-spinal pressure, and also, perhaps, to changes in the fluid.

A rise of temperature, accompanied sometimes by a chill, or even a shiver, occurs in about half the cases within a few hours of the operation. It is usually slight, but may reach 103°. It subsides rapidly, and is of no special significance. The cause of this pyrexia is obscure. No changes in the urine or evidence of leucocytosis, such as would indicate disturbance of nutrition, have been detected.*

If during the operation there is evidence of cardiac depression or respiratory difficulty, such as has been met with by some operators, injections of strychnine should be given, and Tuffier recommends artificial respiration as likely to be beneficial, though he has never yet found any need to make use of it. Fowler of New York gives a full dose of strychnine before the operation in each case, and states that he has found it of great value in preventing any signs of depression.

Remedial Measures for the Effects of Analgesia.—Various attempts have been made to avoid the nausea and vomiting. Small quantities of morphia have been given with the injection or hypodermically, but without any good results. The headache is relieved by the application of cold; phenacetin, and antipyrin are also of benefit.

Marx has strongly advised the injection of $\frac{1}{100}$ grain of hydrobromate of hyoscine as a specific for the after-effects of the injection.

Experiments have also been made with a view of introducing a liquid of similar density to the cerebro-spinal fluid into the subarachnoid space. Thus, Guenard† has used cerebro-spinal fluid itself as a medium for dissolving the cocaine. He places a few drops of concentrated cocaine solution in the syringe, and draws off

* Tuffier, 'Analgésie Chirurgicale,' 1901, p. 20.

† *Semaine Médicale*, October 23, 1901.

sufficient cerebro-spinal fluid to dissolve it, and then injects the solution. Further study, however, appears to be necessary with the object of removing these disadvantages.

Surgical Results of Spinal Analgesia.—A brief review may now be taken of the results that this method has given during the last two years. Tuffier states that he now has knowledge of 1,500 operations performed under spinal anæsthesia. His personal experience comprises 252 operations, and he regards the method as absolutely safe. In this series he had six deaths. Five of these could in no way be attributed to the method of anæsthesia. In one case, a patient with large ventral hernia, death occurred on the day after operation. She was known to have advanced mitral stenosis and multiple fresh emboli were present in the lungs. Tuffier does not consider the death was in any way brought about by the method of anæsthesia.

Galvani of Athens* records 150 operations performed by spinal anæsthesia. These included over 100 abdominal sections. All these operations were performed strictly according to the lines laid down by Tuffier. The puncture of the subarachnoid space was carried out without any difficulty in all but two cases. In these, after several attempts, it was found impossible to penetrate the space. This is a grave drawback of the method, though happily a rare one, and is due to some alteration of the vertebræ from scoliosis, or lack of development of the spinous processes, rendering the usual landmarks difficult to recognise. The analgesia was complete is nearly every case. In three patients, however, it appeared to be more or less imperfect. This is, however, a phenomenon not easy to analyze owing to the dread of pain which is felt during the operation by a certain class of patients. Professor Galvani did not observe serious symptoms in any of his cases. The most frequent trouble met with was the nausea and vomiting from which few patients were entirely exempt. The nausea arose ten to fifteen minutes after the injection, and was often followed by vomiting. This, however, rapidly ceased, the patients becoming 'calm and cheerful.' In a small number of cases vomiting occurred some hours later, and in one case was prolonged for two days. In twelve cases the bowels were relaxed during the operation, but no bladder symptoms were ever observed.

After the operation was concluded, the patients were usually quite comfortable, and often asked for food. The majority suffered from

* *Revue de Gynécologie et Chirurgie Abdominale*, July, August, 1901.

headache, often continuing for twelve hours and subsiding slowly. In two cases the headache continued for five days. The usual rise of temperature was also observed in a great proportion of cases, and sometimes was accompanied by a rigor. None of these troubles appeared in any way to influence the results of the operations.

Galvani considers that, whilst this method presents certain inconveniences, these are to be considered slight and merely temporary.

Fowler of New York has used this method in eighty-one cases.* In some of the earlier cases analgesia was imperfect owing to defective technique. Only once any symptoms arose to cause anxiety. This patient, however, suffered from chronic renal disease, and it is doubtful how far the symptoms could be attributed to the cocaine injection. Many of the cases were examined by Dr. Browning of New York, at intervals after the operation. No changes in the functions of the spinal cord or nerves could be detected. Analgesia was established at intervals varying from two to fifteen minutes after the injection. In one case nineteen minutes was required. In twenty-five carefully observed cases analgesia lasted over one hour in eighteen cases, and less than an hour in seven cases.

Several other American surgeons record cases. Goldan (twenty cases), Wallace Lee (seven cases), Murphy of Chicago, and others.† This method has also been extensively adopted by Roumanian surgeons, especially Racoviceanu-Pitesci (125 cases) and Severeanu (70 cases). The results of their experience were given at the International Congress of Surgery in Paris in August, 1900. The opinions of these surgeons were somewhat conservative as to the value of this method. Pitesci stated that he knew of two deaths having occurred in Roumania, but gave no details of the cases. And both surgeons had observed serious symptoms of collapse in some instances. It is, however, right to state that the dose of cocaine used by them ($\frac{3}{5}$ grain) were greater than the maximum safe dose as laid down by Tuffier.

Villar‡ records a series of thirty-six cases; in two cases he failed to induce analgesia; also a later series of forty cases in which the analgesia was perfect. Cases are also recorded by Denis§ (fifty-three), Kallionzoni‖ (nine), and others.

* *Medical News*, 1901, vol. lxxviii., pp. 1-5; *Philadelphia Medical Journal*, November 3, 1900.

† *Philadelphia Medical Journal*, November 3, 1900.

‡ *Semaine Médicale*, October 10, 1901.

§ *Revue de Médecine d'Algérie*, 1900, pp. 265-277.

‖ *Revue de Chirurgie*, October, 1901, p. 440, etc.

In a personal experience of eighteen cases of spinal anæsthesia,* performed strictly according to the technique of Tuffier, the following observations were made: Analgesia was absolutely complete in fifteen cases; in two slight pain was felt; and in one case, due to the injection not having reached the subarachnoid space, no analgesia was induced, and the operation (ovariotomy) was carried out under chloroform. The operations included seven abdominal sections—ovariotomy (2), Cæsarean section (1), oöphorectomy (2), ventrofixation (1), exploration for myoma and pregnancy (1). The remaining cases were: amputation of cervix (1), ligature of uterine artery (1), perineorrhaphy (2), hæmorrhoids (2), curettage (2). In two cases posterior vaginal section was performed for pelvic suppuration.

The operation was well borne in every case. Nausea and sickness occurred in 40 per cent. at some stage of the operation. In abdominal operations this is a disadvantage, and care is required to prevent the possibility of extrusion of bowel into the wound. All the patients made uneventful recoveries. In thirteen cases no vomiting whatever occurred after the operation, and in one case only was it severe—a case of acute pelvic peritonitis. Cephalalgia was observed in 70 per cent. of the cases. In two cases it was severe, and in one instance it continued for three days. Phenacetin in 10-grain doses given immediately after the operation appeared to mitigate the severity of the headache. A rise of temperature (100° to 101°) occurred within a few hours of the operation in the majority of cases. In one patient the temperature rose to 103° with a slight shiver; it then fell to normal, and remained so.

From this limited experience, the results obtained confirm the conclusions of Tuffier in every respect, and in patients who have a dread of general anæsthesia, or in whom for any reason it is undesirable, this method may be adopted with confidence. Certain details add much to the comfort of operating upon a conscious patient. Thus, it is well to put cotton-wool in the ears, and to place a handkerchief over the eyes of the patient. She should also be reassured at intervals during the operation. Silence should as far as possible be enjoined. If the patient complains of thirst, soda-water may be given, and does not increase the nausea, which, indeed, rarely persists beyond a quarter of an hour after the injection has been made. Spinal anæsthesia is not suitable for hysterical women, in whom the simple sensation of contact may suggest

* Lea, *Medical Chronicle*, December, 1901.

painful sensations. Cases of heart disease or arterio-sclerosis bear this method of anæsthesia very well (Tuffier).

In *extraperitoneal* operations this method is very satisfactory, and compares favourably with general anæsthesia. 'The future alone will show if it will replace it' (Tuffier).

In *intraperitoneal* operations the possibility of sickness occurring during the operation forms a serious inconvenience. In many intraperitoneal operations some nausea may not be of serious importance, but in prolonged and difficult abdominal operations it is otherwise; and although Tuffier has had no accident of any kind, he does not advise that spinal anæsthesia should be generally adopted for these cases at the present time.

Dangers of Spinal Anæsthesia.—Although Tuffier regards the method as perfectly safe, the experience of other operators does not altogether go to prove this, and it is obvious that unless the technique is carried out with the greatest care serious results may follow. The possible sources of danger are:

1. *Mechanical Injury.*—This risk appears to be slight, and no cases of injury to the spinal cord or nerves have been recorded. The nerve structures float freely in the subarachnoid space, and the minute puncture of the needle is not likely to cause any serious damage to nerve structures in healthy subjects. In pathological conditions of the vertebræ or meninges, injury to the cauda equina has followed lumbar puncture (Quincke). Cadol* records a case of meningeal hæmorrhage following puncture in a patient with old tubercular lesions of the cord. It is also possible, if the needle is badly directed, to enter the intervertebral disc, or even the abdominal cavity.

2. *Sepsis.*—No cases of meningitis following subarachnoid injection have been as yet recorded. It is clear, however, that this is a real risk, and can only be avoided by the most careful aseptic precautions.

3. *Organic Nerve Changes.* — Nicoletti† of Naples has shown experimentally in dogs that no histological lesions of the cord follow subarachnoid injections of cocaine. Tuffier has examined over sixty of his cases up to twelve months after the injection, and has not found any evidence of structural or functional lesions of the nervous system.

4. *Toxic Symptoms.*—Many cases have been observed in which

* *Thèse de Paris*, 1900.

† International Congress of Medicine, Paris, 1900.

serious, or even alarming, phenomena have manifested themselves during the operation or some hours afterwards. Reference has already been made to the cases mentioned by Pitesci and Severeanu, when great pallor, cold sweats, relaxation of the sphincters, with circulatory and respiratory weakness, were noted during the operation, necessitating energetic restorative measures. In these cases 2 centigrammes of cocaine ($\frac{2}{5}$ grain) were used, which is a larger dose than it is probably safe to adopt. Tuffier's maximum dose is $1\frac{1}{2}$ centigrammes, and he states that he has never seen any symptoms which caused anxiety either during the analgesia or afterwards.

5. *Imperfect Analgesia.*—In the early days of the method, failures to obtain complete analgesia were very frequent, either from defective technique, such as using too large a needle (Goldan), or from inert solutions of cocaine. Some patients, moreover, are peculiarly insensitive to the effects of cocaine. This has been specially noted in alcoholic patients. The duration of the analgesia is also somewhat variable, and in some cases it may not be complete for more than thirty minutes. If, however, the method of Tuffier be strictly followed, failures to induce complete analgesia are very rare.

6. *Deaths following Spinal Anæsthesia.*—At a recent meeting of the Société de Chirurgie of Paris (April, 1901), Tuffier states that, 'if a comparison is made between this and other methods of anæsthesia, we must distinguish between deaths during an operation and those which occur later. Up to the present spinal anæsthesia has not been followed by a fatal result during the operation.' The six post-operative deaths which have occurred in his practice he was unable to trace in any way to the method of anæsthesia.

Pitesci of Bucharest mentioned two deaths as having occurred in Roumania after spinal anæsthesia, but no details have as yet been published. Goilav* reported one case in which a fatal result followed the injection of cocaine, but the paper has not been available for review. Fowler† has not met with any serious symptoms in his series of eighty-one cases, and states that he is unaware of any recorded deaths having occurred in America. Lequeu‡ mentions two cases in which operations were carried out on patients who were considered unfit to take a general anæsthetic on account of their serious condition. Both patients died, but Lequeu does not attribute the deaths to the injection. In another case of acute intestinal obstruction death followed shortly after the operation, but the patient's

* *Revue de Chirurgie*, Bucharest, 1900, p. 250.
† *Medical News*, vol. lxxviii., 1901, pp. 1-5.
‡ *La Semaine Médicale*, November 13, 1901.

general condition was at the time so grave as to preclude the administration of a general anæsthetic. Broca,* at the Société de Chirurgie, Paris, recently mentioned a case in which death occurred eighteen hours after the operation, and was thought to be due to the spinal anæsthesia. The case, however, had been reported to him from Morlaix, and no details were given.

It is evident, then, that cases of death clearly resulting from this method of anæsthesia have yet to be recorded. It is, indeed, of the greatest importance that any such cases should be reported in full, so that a real comparison may be possible between the risks of this and other forms of anæsthesia.

Simple lumbar puncture may be followed by a fatal result, and Gumprecht† has collected from various sources eighteen cases. They were all in patients with organic disease of the central nervous system, and considerable quantities of fluid were withdrawn in many cases. The sudden evacuation of the cerebro-spinal fluid appears to paralyze the vital centres in the medulla. These cannot, however, be compared to ordinary cases of spinal anæsthesia in patients with a healthy nervous system.

It is worthy of note that Bier,‡ who may be called the founder of this method, advises circumspection in its use, and cautions us against the general adoption of spinal anæsthesia. He says that 'in its present form it does not merit the enthusiasm with which it has been adopted by some. It presents such marked advantages that we should seek to render its use entirely free from risks or drawbacks, and further researches should be made, with the object of finding an analgesic agent free from the risks of cocaine.'

Eucaine has proved practically useless, producing very incomplete anæsthesia.

Schwarz§ of Agram has recently used tropacocaine with success in sixteen cases. The dose required is larger than that of cocaine, but the disagreeable manifestations of the latter were absent, and he is of opinion that this drug will become generally used for spinal anæsthesia in the future.

The Use of Spinal Anæsthesia in Obstetrics.

The first observations on the value of spinal anæsthesia by cocaine during delivery were published by Kreis,‖ who related in detail six

* *La Semaine Médicale*, July 10, 1901.
† *Deutsche Med. Woch.*, June, 1900.
‡ Surgical Congress, Berlin, April 11, 1901.
§ *Centralblatt für Chirurgie*, February, 1901.
‖ *Centralblatt für Gynäk.*, No. 28, 1900.

cases from the clinic of Professor Bumm at Bâle. In all of these delivery was effected without pain. Almost simultaneously Doléris related five cases at the Academy of Medicine in Paris (July 17, 1900), and since this time Doléris has used this method extensively. These cases, sixty-two in number, have been recorded in full by Malartic* in his thesis on the subject. From an experience of eighty cases, Doléris claims that cocaine has, in addition to its analgesic influence, a very decided 'oxytocic' effect on uterine contractions.† Dupaigne,‡ acting on the recommendation of Tuffier, used this method in several cases, and brought his results before the Academy of Medicine in August, 1900.

Spinal anæsthesia was speedily adopted in America, where it is especially associated with the name of Marx, who has now used it in over 100 cases.§ The technique in no way differs from that for surgical operations described above. In some cases, however, it is impossible for the patient to sit forwards, and the injection must then be made in the left lateral position. Great care is also necessary to avoid involuntary movements on the part of the patient, such as may be caused by the sudden onset of painful uterine contractions during the injection.

The analgesia produced is usually complete for all the pains of labour—the uterine contractions, dilatation of the cervix, vaginal and vulval distension, and the painful lumbar radiations. Further, it is possible to perform all the usual obstetric operations, although exception may be made to those procedures which require the introduction of the hand into the uterus, since cocaine appears to have a distinct influence in promoting uterine contraction.

Delivery by forceps, craniotomy, and symphyseotomy (Porak) have been frequently performed under its influence. Doléris‖ records a case of Cæsarean section under cocaine, with complete absence of any pain or evidence of shock. Professor Sinclair of Manchester in May, 1901, used this method in a case of Cæsarean section in which general anæsthesia was thought inadvisable on account of bronchitis. The patient was perfectly at ease throughout the operation, which lasted thirty-five minutes. The uterus contracted well, and there was an entire absence of shock or cardiac depression.

* *Thèse de Paris*, 1901.

† *Bulletin Médical*, February 13, 1901.

‡ *Annales de Gynécologie*, January, 1901.

§ *Medical Record*, October 6, 1900; *Philadelphia Medical Journal*, November 10, 1900.

‖ *Thèse de Malartic*, *Obs.*, lxii., p. 77.

Complete analgesia may be relied upon for one and a half to two hours; in rare cases it may continue for four hours (Dupaigne). The analgesia may be prolonged by repeated injections, and Marx states that he has been able to maintain complete anæsthesia for eight hours in this way. The short duration of the analgesia is, however, a decided drawback to the general adoption of this method to relieve the pains of labour. Further repeated injections are not free from risk, owing to the toxic effects of cocaine. Marx* states that the injection should be given when the os is three-quarters dilated in multiparæ, and at the stage of full dilatation in primiparæ. The injection is usually followed by cramps and trembling of the lower limbs, nausea and sickness, headache, and a rise of temperature. These symptoms rapidly subside, but Reclus† has observed cases in which the sickness persisted for three to five days.

Influence of Cocaine on Uterine Contraction.—Clinical experience has shown that the contractions of the uterus continue regularly under the influence of cocaine. Dupaigne found that the uterine contractions were increased in force and frequency, and considered that the duration of labour was distinctly lessened.

The 'oxytocic' action of cocaine on the uterine muscle has been especially insisted upon by Doléris.‡ He states that the uterine contractions increase in force and frequency, dilatation of the cervix is more rapid, and the second stage of labour is shortened. He further believes that uterine retraction after delivery is more complete, and thus the risk of hæmorrhage is diminished. In cases of uterine inertia he has observed the pains to return with remarkable vigour after the injection of $\frac{1}{5}$ grain of cocaine. In the case of Cæsarean section Doléris noted that the uterus remained firm and contracted after delivery of the child and whilst the sutures were being applied, and 'in no previous case had he observed such thorough and prolonged contraction.' Doléris believes, further, that injection of cocaine may bring about uterine contractions, and he gives the details of two cases: (1) A patient seven months pregnant with a macerated fœtus. After being under observation three weeks, 1 centigramme of cocaine was injected. Uterine contractions commenced in a few minutes, and labour was completed in six hours. (2) A multipara pregnant eight months was suffering from advanced tuberculosis. A few minutes after the injection the uterus con-

* *Medical Record*, October 6, 1900.
† *Bulletin Médical*, March 20, 1901, p. 254.
‡ *Ibid.*, February 13, 1901.

tracted vigorously, and labour was completed in four and a half hours.

In a case of placenta prævia, with severe hæmorrhage, an injection of cocaine was followed by uterine contraction and cessation of hæmorrhage even before the membranes were ruptured. Other observers, however, have not as yet confirmed the observations of Doléris on the 'oxytocic' effects of cocaine in labour, and in looking through the records of cases it is noteworthy that forceps have been applied very frequently. Thus, Kreis used forceps in three out of six cases, and Marx, in forty cases, found forceps necessary in sixteen.

Porak, Rouville, and Puech* have all observed cases in which the injection of cocaine appeared to distinctly diminish the force of the uterine contractions, and a study of the cases of Doléris as recorded by Malartic† shows that in several instances the uterine contractions appeared to weaken after the injection.

Ehrenfest,‡ having noticed the frequency with which it has been found necessary to terminate the labour by artificial means, observes that in these cases the active help of the abdominal muscles is wanting. The patient is not conscious of the uterine contractions, although she is able to exert the abdominal muscles when requested to do so. This voluntary effort on the part of the patient is generally agreed to be an important factor in concluding the second stage of labour. If further experience confirms this by showing that the percentage of artificial deliveries is greater after spinal cocainization than under normal conditions, the use of this method would certainly be contra-indicated as a means of mitigating the pains of labour, since, in spite of all care, instrumental deliveries show a greater mortality than deliveries effected by natural means alone.

The Risks of Spinal Anæsthesia in Obstetrics.—The toxic phenomena are as a rule slight, and rarely cause any serious inconvenience. Marx believes that hydrobromate of hyoscine ($\frac{1}{100}$ grain) has a specific effect in relieving the headache and other symptoms. Goldan§ of New York observed alarming symptoms in one case after injection of $\frac{2}{5}$ grain in a primipara. The respiration became very rapid—60 per minute—and the pulse 140 per minute, with extreme pallor. The patient, however, made a good recovery, though

* *Gazette des Hôpitaux*, July 27, 1901.
† *Thèse de Paris*, 1901.
‡ *Medical Record*, December 22, 1900.
§ *Medical News*, 1900, p. 719.

the headache was very intense for forty-eight hours. Marx has never observed any serious symptoms in over sixty cases. And Doléris has adopted it in seventy-eight cases without any accident or bad effects. Up to the present time no deaths have been recorded from the use of this method in labour.

Influence of Cocaine on the Fœtus.—If the dose of 1 centigramme ($\frac{1}{5}$ grain) be not exceeded, the injection is without influence on the condition of the fœtus. If, however, larger doses are given, slowing of the fœtal heart-sounds is observed, and in some cases the child has been born in an asphyxial condition. In those instances in which the cocaine acts powerfully as a stimulant to the uterine muscle, the circulation of the fœtus may be seriously impeded, and it is probable that its life may be endangered, though no fœtal deaths appear to have been definitely traced to this cause.

Influence on the Puerperium.—The involution of the uterus appears to be somewhat hastened, and there is less tendency to the formation of blood-clots and after-pains. Few detailed observations have, however, as yet been made. The lacteal secretion is normally established, and the child's nutrition is well maintained (Malartic).

Indications for Use.—The influence of cocaine on the uterine muscle in promoting contractions, which appears to be very definite in a large proportion of cases, limits the sphere of usefulness of this method in obstetric practice, as when complete muscular relaxation is required for podalic version or other intra-uterine manipulations.

Gueniot in a communication to the Academy of Medicine of Paris on January 22, 1901, lays down the following conditions as contra-indicating the use of cocaine in labour:

1. Disease of the heart or great vessels.
2. Chronic disease of the respiratory organs.
3. Chronic affections of the central nervous system.
4. The absence of facilities for securing complete asepsis.

Gueniot admits the following conditions as suitable for the use of cocaine:

1. Any obstetrical operation requiring anæsthesia, with the exception of those in which it is necessary to introduce the hand into the uterine cavity.
2. Excessive pain during labour.
3. Prolonged labour owing to feeble or irregular contractions of the uterus, in the absence of any obstruction.
4. In conditions tending to hæmorrhage, such as uterine inertia, placenta prævia, etc.

Spinal anæsthesia has been used in obstetrics for two distinct purposes: (1) to mitigate or remove the pain of labour; (2) as a method of analgesia for the performance of obstetric operations. The duration of the analgesia is insufficient to render labour free from pain, unless repeated injections are given. This plan exposes the patient to the risk of toxic symptoms, and also to the dangers of repeated puncture of the subarachnoid space, and hence cannot be generally advisable. It is, however, possible to give the injection when the os is nearly or fully dilated, and so to produce analgesia through the second stage of labour; but under these circumstances small quantities of chloroform give very good results. It has been held by some that chloroform tends to produce hæmorrhage after delivery, but it has been shown (Lucas, Championnière, Schroeder, Budin*) that hæmorrhage after the administration of chloroform is not more frequent than in normal cases. If, however, a distinct tendency to hæmorrhage is present, spinal anæsthesia by cocaine may by its stimulating action on the uterine muscle possess certain advantages. Up to the present time it appears to have been adopted in over 200 cases without any serious accident.

Puech,† in reviewing the subject, considers that up to the present spinal anæsthesia has not rendered better service in obstetrics than the general anæsthetics. It is not capable of producing painless labour, and in operative work the advantages over chloroform are not established. Further, this method requires great care, with special apparatus and facilities, and hence can hardly be generally adopted in obstetric practice.

* Budin, 'Traité d'Accouchements,' t. iv., 1901, p. 182.

† *Gazette des Hôpitaux*, July 27, 1901.

REVIEW OF CURRENT LITERATURE

OBSTETRICS.

Critical Notes on Difficulties in Labour after Vaginal Fixation of the Uterus.—RÜHL of Dillenburg (*Monats. für Geburts. und Gynäk.*, Oct., 1901) contributes this important paper. The operation of vaginal fixation for retro-displacements of the uterus has not up to the present been largely practised in England, and perhaps the reason is that papers have appeared from time to time describing difficulties which have occurred in labour following on the operation. The causation of the difficulties has not been satisfactorily explained, and in some cases, as the author of this paper shows, they cannot be entirely attributed to the foregoing vaginal fixation. The proportion of difficult to normal births following on the operation has not been worked out, and so a false impression of the after-results of the operation has arisen. There is no doubt that difficulties can be caused by the operation, especially if, as the author points out, it is performed by the old method of fixing the fundus uteri to the vagina. As *Z*weifel has shown, this method gives a firm and wide attachment to the vagina, which may produce labour difficulties. For all this, only nine cases of Cæsarean section have been recorded in patients who have previously undergone vaginal fixation. Rühl states that upwards of a thousand cases of vaginal fixation have been performed, and in hundreds of cases labour has progressed naturally afterwards. It would have been more convincing if the author had inserted some actual figures here from other observers as well as his own. He mentions seventy-one labours following vaginal fixation, and apparently the labour disturbances were only very trifling. The author condemns the old method of operating, but admits that many labours following it have been conducted in a normal manner; so that it must be assumed that the cicatrix fixing the fundus to the anterior vaginal wall must be able to stretch sufficiently to allow the uterus to assume its normal position. The method of operating advocated is not mentioned, but it may be presumed to be Mackenrodt's vesical fixation, or some modification of it.

The question arises, Why was Cæsarean section necessary in nine cases? Was there some unusual condition present, so that the vaginal fixation played a lesser part in the causation of the difficulties? The difficulties described resulted from: (1) the low anteverted position of the fundus; (2) the high position of the cervix; (3) retroposition of

the cervix; (4) thinning of the posterior uterine wall; (5) defective stretching of the anterior wall. All these difficulties are caused by the firm adhesion of the fundus to the anterior vaginal wall, which does not stretch sufficiently to allow it to take its normal position. The cervix for the above reasons cannot be easily reached, the posterior lip of the os uteri thins prematurely, and the anterior remains thick. The labour is characteristically tedious. Owing to the position of the cervix, the operations of forceps, turning, etc., cannot be performed. In a case of the author's, although the foot could be felt, yet version could not be completed. If in such a case the abdomen opened, the posterior uterine wall would present in the wound, and the anterior would not appear, as is described in some of the Cæsarean section cases. This is the condition one would expect, and the conclusion is clear that an unusually firm cicatrix between the fundus and the vaginal wall is the cause of the trouble. The author has shown in another paper that the lower the fundus was fixed to the vagina, the higher and more retroposed the cervix became. Spiegelberg has shown that in many cases of non-dilatation the cervix will be found to be displaced upwards and backwards, but it can hardly be supposed that mere anteflexion will render the cervix undilatable. On the other hand, the wide surfaces bared in the early steps of the operation, during separation of the bladder, will lead to so much cicatrization on the anterior wall of the cervix that difficulties in dilatation might be expected to appear. Of the characteristic difficulties following vaginal fixation, undilatability of the anterior lip of the os uteri is the chief; the lateral and posterior portions dilate readily enough, and eventually allow the labour to proceed normally. Now, if total rigidity of the cervix is present, there must be some other peculiar cause in addition. Such causes may be: previous operations on or previous inflammatory conditions of the cervix, and probably, although the author does not mention it, some interference with uterine contractions, so that they are not powerful enough to dilate it. And here it may be argued that, where a fundus is firmly bound down to the anterior vaginal wall by cicatrices, it is reasonable to suppose that the uterine contractions would be interfered with. The author carefully reviews the nine cases of Cæsarean section, with a view to answering the following questions:

1. Were the difficulties caused by the vaginal fixation alone?

2. Were there other conditions present which increased the difficulties caused by the vaginal fixation?

3. Were the difficulties unconnected with, or only connected to an unimportant degree with, the vaginal fixation?

After describing the cases, it appears that in *only two* could the vaginal fixation be absolutely blamed for the labour difficulties. In

five there was extremely widespread cicatrization from complications' and so the operation could not be held responsible. In one eclampsia supervened and made Cæsarean section imperative. And in one total rigidity of the cervix, attributed to previous metritis, was present, and so the vaginal fixation could not be blamed for the difficulty.

From these arguments the author concludes that vaginal fixation has fallen into disrepute in some quarters on false and insufficient grounds. No operation is invented which does not sometimes produce evil results, and, comparing vaginal fixation with ventrifixation, the author states that ten times as many of the former as of the latter have been performed, and yet already nine Cæsarean sections have been described in labours following on ventrifixation. Vaginal fixation has produced more lasting cures, and has less evil results on parturition than any other fixation method.

Prolonged Stay of the Fœtus during Labour in the Enormously Dilated Cavity of the Cervix.—The above title forms the subject of an article by Professor RAPIN (Lausanne) in *La Semaine Méd.* (Nov. 12, 1901, p. 369) on the case of a primipara, aged twenty-five, to whom he was summoned on February 1, 1901. The patient did not recollect the date of her last period, as she had always been irregular. Fœtal movements were first noticed at the beginning of September, and ceased about January 20, when she was seized with violent pains in the abdomen, which lasted for some hours, and recurred every day for a week. On January 30, at 2 p.m., labour commenced, and at 5 a.m. the following morning the 'waters' broke and the expulsive pains began. A midwife was then summoned, who found the os uteri fully dilated and the head engaged in the pelvis. She could not hear the fœtal heart-sounds. Pains ceased about 7 a.m., and about 10.30 a.m. the midwife noticed the appearance of a rounded swelling, of the size of two fists, situated between the umbilicus and the symphysis. The pains returned, but, as the head did not advance, she called in M. Rossier, the 'privat-docent,' who on his arrival, about an hour afterwards, made the following notes: 'The patient is of small stature and shows evidence of rickets. Measurements of the pelvis are as follows:

Interspinous	...	...	...	24·0 cm.
Intercristal	...	...	...	27·0 „
External conjugate		...	...	17·4 „
Conjugate of the outlet		...	...	10·0 „

The os uteri is fully dilated, the head engaged in the pelvis in a left occipito-anterior presentation, caput succedaneum well marked. Fœtal heart-sounds are not perceptible. Between the umbilicus and the symphysis is a tumour of elastic consistence, which is continuous towards the epigastrium with an extremely thin wall

which covers the breech of the fœtus.' Thinking that the tumour arose from retention of urine, Rossier passed a catheter into the bladder, and drew off 200 to 300 c.c. of urine, but without in any way altering the appearance of the abdomen. Forceps were applied, and after powerful traction the head was delivered, the skin of which was macerated. In spite of the most powerful traction on the head, it was found impossible to move the trunk. Professor Rapin was then summoned, as Rossier considered that the obstruction might be due to a swelling situated on the back of the child (spina bifida). Rapin, on examining the abdomen, noticed that the tumour, which was of soft consistence and resisted pressure, became more prominent during the contractions, and agreed with Rossier that the presence of a tumour on the back of the child could alone explain the difficulty of delivering the body of the fœtus. On vaginal examination, however, he found that both arms were extended along the body and were impacted in the pelvis. He then pushed the left shoulder (the head only being delivered) into the concavity of the sacrum, and succeeded in delivering first the corresponding arm, and then the right arm, after which the trunk followed, not, however, without offering distinct resistance, which was attributed to the presence of the tumour on the back of the child. When delivered, the child, a girl, was found to have no tumour. Though macerated, she was well formed, with a large body and a flaccid and bulky abdomen. On internal examination the hand passed from the vagina into a dilated sac, the walls of which were soft and thin, and presented transverse folds on the interior. It was not possible to feel the top of the sac behind, whilst in front and at the sides the finger impinged against the edge of the contraction ring, which was invaginated into the sac. By strongly depressing the body of the uterus from above, Rapin convinced himself that there was no rupture either in the neck or body of the uterus.

In commenting upon the above case, Rapin concludes that the tumour, which appeared slowly five hours after complete dilatation, and at least twenty hours after the commencement of labour, was none other than the body of the uterus, retracted, and containing the partially separated placenta ; and that the sac, mentioned above, was the enormously dilated cervix. The contraction ring had ascended bit by bit over the body of the fœtus, and the posterior wall of the cervix must have stretched itself sufficiently without rupturing to allow the contraction ring to pass over the breech of the child to the front of the abdomen, where the uterus formed the tumour, the diagnosis of which proved so difficult. He further points out that after the appearance of the swelling, and even before, the patient was continually threatened with rupture of the

uterus, the fear of which induced Rossier to apply the forceps. The bleeding which appeared after the delivery of the head was caused, in his opinion, by separation of the placenta consequent on retraction of the uterus. The proof of the above explanation being the correct one, is, according to Rapin, that the tumour no longer existed as such after the birth of the child, and that nothing remained but the globular body of the uterus, with an extremely dilated cervix, folded on itself like an accordion.

Unusual Perineal Rupture in a Primipara (*Cent. für Gynäk.*, No. 36, 1901).—ERWIN KEHRER, of Bonn, describes the case of a primipara (age not stated), who was delivered in the obstetric ward of the hospital. The presentation was left occipito anterior. The vagina was very narrow and rigid; it presented numerous wart-like elevations and a muco-purulent discharge, but no gonococci were found. Twenty-two hours after the pains began the anus was observed to be widely dilated, but retained its round contour, and presenting through it was seen the nose and upper lip of the fœtus, and later the mouth and the hair on the forehead, whilst the occiput presented at the vulva. The perineum was thinner in the middle, and a typical central rupture was expected, but it tore at its two extremities in spite of all efforts to keep the head back. When all hope of saving the perineal floor was lost, it was cut through centrally with scissors. The lower third of the posterior vaginal wall was torn, the rectovaginal septum was torn, and the rectum only in its postero-lateral walls remained attached to the sphincter. The split anterior rectal wall was drawn up to a great distance from the sphincter, which, until the perineum ruptured, was intact. The vaginal wall was sewn up with catgut, the perineum with silkworm sutures, and the last two stitches passed through the sphincter ani and then through the retracted rectal wall on the one side, and again through the rectal wall and sphincter on the other side of the tear. This closed the sphincter, and at the same time brought down the retracted bowel by a kind of purse-string suture. A rubber tube wrapped in gauze was inserted through the repaired sphincter. The healing of the wound was complete; there was no rise of temperature. The bowels were opened on the tenth day, sutures removed on the eleventh day, and an enema given. There was no dyschæsia when the patient was discharged from hospital on the twenty-first day, and the sphincter action, both for fæces and flatus, was completely restored.

Uterus Bicornis; Dystocia; Cæsarean Section.—CRIMAIL (*Rev. de Gynécol. et de Chir. Abdom.*, Sep. and Oct., 1901) recently read, at the Nantes Meeting of the Congrès d'Obstetrique, de Gynécologie, et de Pédiatrie, a note on a case of lingering labour, the cause of which was quite unsuspected until Cæsarean section was

undertaken. The membranes ruptured early, and the os did not dilate completely even after the use of bags and other instruments. On the third day the forceps was used, but delivery could not be effected. Then Cæsarean section was performed, and it was not till the uterus had been opened and the fœtus extracted that the malformation was clearly detected. Pinard, discussing this case, referred to Fochier's observation of another instance of this malformation, where also there was rigidity of the cervix, associated with tonic contraction of the uterus. Pinard noted that during labour the non-gravid side of the uterus mechanically interfered with uterine contraction and dilatation of the cervix, just as though it were a myoma in an unfavourable position.

Is Cæsarean Section Justifiable in the Treatment of Placenta Prævia? (E. GUSTAV ZINKE, M.D.: *Amer. Gynæcol. and Obstet. Jour.*, Aug., 1901).—Cæsarean section has been performed seven times in America and once in this country—by Lawson Tait—in the treatment of placenta prævia. Zinke, in a carefully-prepared tabulated record, gives an interesting detailed account of these cases, the only ones, so far as is known, which have been so treated. Six of the patients were subjected to the Cæsarean and two to the Porro operation (in all the placenta was central). Of these, five mothers and six children were saved. For statistical purposes, however, the author thinks that two cases should be excluded. Of the first of these two the record is very imperfect, the reporter stating only 'that the operation was done under very unfortunate conditions' (probably after everything else had been tried), and both mother and child were lost. The second was one of rigid, probably malignant, cervix, and forcible dilatation with steel dilators, Barnes's bags, etc., and profuse and frequent hæmorrhages, for a period of seven days, preceded the operation, which was done when the patient had a temperature of 102° F., and was probably septic. The child had been dead for two days, and the mother died in twelve hours after operation. The remaining six cases give a maternal mortality of 17 per cent., and no fœtal mortality.

Taking the average for a large series of statistics of placenta prævia treated by plugging, dilatation, version, etc., Zinke finds that the record shows a general maternal mortality of 25 per cent., and a fœtal mortality of 65·21 per cent. The average mortality of modern Cæsarean section, from a series of statistics, he gives as 4·14 per cent. for the mother, and for the child 13 per cent. As the Porro operation is done so often of necessity where there is already some disease or injury, the mortality is much higher: maternal 37 per cent., fœtal 22·22 per cent. Even these figures, it is pointed out, compare very favourably with the mortality of placenta prævia treated in the accustomed way by the ablest men even since the days

of asepsis and antisepsis. While not doubting that cases of partial placenta prævia may be successfully treated in the old way, the author concludes that 'the Cæsarean and Porro operations are perfectly legitimate and elective procedures in all cases of placenta prævia, central and complete, and especially so when the patient is a primipara, when the os is closed and the cervix unabridged, when hæmorrhage is profuse and cannot be controlled by tampons, and separation of the placenta around the internal os is difficult or impossible.' A valuable bibliography is appended to the article.

Recent Inversion of the Uterus.—PINARD (*Ann. de Gyn. et d'Obstet.*, Oct., 1901) distinguishes three forms of inversion, according as it is immediate, recent, or chronic. The distinction is made according as the condition is recognised immediately after delivery, or only after several days, or, lastly, after a much longer time. He relates two cases of the intermediate or recent variety. The first occurred three days after a normal labour, during the straining of defæcation. Attempts at reduction were made unsuccessfully, after which a Champetier's bag was introduced into the vagina. The next day, under anæsthesia, the inversion was found to be irreducible. The mass was of a violet colour, and showed superficial patches of necrosis. Expectant treatment was deemed inadvisable in view of the fact that the uterus had almost certainly become infected by its immersion in a basin of fæcal matter, and already showed patches of necrosis. Hysterectomy was therefore performed, with a successful result. In the second case also labour was said to be spontaneous. Hæmorrhages set in, and it was not till the fourth day that inversion of the uterus was diagnosed. Three days later she was taken into hospital, and a medium-sized Champetier bag was introduced. In the evening reduction had been partially effected, but during examination the patient cried out loudly, and it could be felt that the inversion was taking place again, so a full-sized Champetier bag was introduced, and fully distended. The next day reduction was found to be complete, and the bag was removed. During the succeeding fortnight the temperature and pulse gradually came down to normal, the treatment consisting at first of intra-uterine quinine douches and injections of saline solution, and, later on, of morphia. Pinard remarks that the difference in the treatment of the two cases was due to the fact that in the first the circulation was obstructed—it was, in fact, a case of strangulation—whilst in the second the circulation was still apparently free. He considers that Champetier's bags possess an advantage over all other plans in the reduction of an inversion.

Latent Microbic Endometritis in Pregnancy (ALBERT: *Archiv. für Gynäk.*, vol. lxiii., p. 488, 1901).—The writer of this paper illustrates the idea which he wishes to bring forward by an elaborate account

of two cases. In one instance pregnancy proceeded normally to the seventh month, when labour came on, with symptoms of septic intoxication. The patient died undelivered at the end of three days. The autopsy showed that the endometrium was the primary seat of infection, and that the main focus of disease was situated near the fundus. There was no lesion from which infection could have been carried to the uterus by way of the blood-stream. In the other case the patient was ill for two weeks at the end of pregnancy. Labour then began, and she was delivered without instrumental interference four hours after the first vaginal examination was made. She died forty-two hours after delivery, and at the autopsy the source of septic intoxication was found to be situated in the endometrium and near the fundus. The body, as in the first case, was free from any other septic lesion. The writer states that in each case the clinical history and the post-mortem examination proved that the endometrium must have become infected, if not before pregnancy began, at least before the onset of labour, and with the membranes still unruptured. He concludes that there were, during pregnancy, organisms within the decidua, placenta, membranes, or uterine muscle, of whose existence there was no sign until they finally became active, with a fatal result to the patient. Such cases the writer considers to be comparatively common. Amongst 6,500 puerperal women he counted twenty-four cases, six of them fatal, in which infection could not have occurred during or after labour, and in which gonorrhœa could be excluded. He admits, however, the possibility that these patients may have been infected before labour by taking baths, by coitus, or by the vaginal examination of a midwife before their admission to hospital. (It is interesting to find a writer so confident in the aseptic and antiseptic precautions adopted in his hospital that he can assert that infection did not occur either during or after labour.) The writer recognises that many cases of fever during the puerperium for which no obvious cause appears are due to gonorrhœa. He also grants that ten or twelve examinations of the lochial discharge may be necessary before gonococci can be found. He states that he himself succeeded in demonstrating, by repeated examinations, the presence of gonococci in 25 per cent. of the cases in which fever occurred amongst 2,300 puerperal women. In the cases above mentioned, however, he was unable to ascertain the presence of gonococci, and he therefore concludes that there are other organisms which can remain in a latent state within the uterus throughout pregnancy, causing no symptoms until during the puerperium they become active once more.

The writer condemns the term 'self-infection' as being most misleading, and suggests for these cases the name of 'latent microbic endometritis.' He next enters upon a long résumé of the literature

dealing with the flora of the uterine cavity, and concludes that the vaginal organisms can invade the uterus, under certain circumstances, at any time of life, more easily after the appearance of menstruation than before; that infection of this character can become latent after an acute stage, which may be so short and so slight as to escape notice; and that conception is possible, in spite of such latent infection of the uterine mucosa. He holds that a majority of abortions and miscarriages which run a septic course, together with many diseases of pregnancy and the puerperium, depend upon latent microbic endometritis. He considers that, up to the present time, all measures taken to prevent puerperal fever have been commenced much too late. Not content with aseptic and antiseptic precautions during labour, he would institute them at the commencement of pregnancy, if not before.

Hæmaturia of Pregnancy.—CHIAVENTONE (*Ann. de Gyn. et d'Obstet.*, Sep., 1901) defines this complication as 'a hæmaturia without hereditary or individual pathological antecedents which supervenes during pregnancy, and passes off with its termination, which is marked by the absence of ordinary lesions, and is entirely and exclusively brought about by pregnancy.' Albarran had collected twelve cases of hæmaturia during pregnancy, but in five of these, as Chiaventone shows, the hæmorrhage was due to pathological conditions other than pregnancy, viz., hæmophilia, nephritis, cystic tuberculous kidney, and chyluria followed by hæmaturia of probably parasitic origin. These five cases are instances of *hæmaturia during pregnancy*. The remaining seven are admitted by the author as genuine cases of *hæmaturia of pregnancy*, and he adds the notes of a personal case, making eight cases recorded in all. As a working hypothesis of the cause of this condition the author suggests that it may be due to a gravid toxæmia brought about by hepatico-renal insufficiency. Prognosis is not unfavourable. Treatment is expectant, for ordinary styptics appear to be of little value. If the loss of blood is grave, the membranes should be punctured or labour induced. An excellent résumé of published cases is appended to the paper.

The Pathology and Etiology of Eclampsia.—In the *Cent. für Gynäk.*, No. 40, 1901, HERZFELD publishes the conclusions which he drew from an investigation of the post-mortem reports for the last ten years of the Pathological Institute in Vienna. During this period 81 autopsies were made of cases of eclampsia. The 81 fatalities occurred in a series of 463 cases of eclampsia treated (about 17 per cent.), and these 463 cases corresponded to 96,000 deliveries (about 5 per 1,000). Eleven years previously Herzfeld, by a similar statistical research, found that the percentage of fatalities reached 25 per cent. The decrease in death-rate at the present time he

attributes to prophylactic treatment. The eighty-one autopsies all showed changes in the uropoietic tract, and most cases showed œdema of the brain, and changes in the liver, spleen, cardiac muscle, and valves. With regard to the renal changes, Herzfeld found evidence of chronic nephritis in thirty-eight of the eighty-one cases. The kidney changes in these were of too chronic a nature for them to have started during the fatal pregnancy. In twenty-five cases parenchymatous degeneration of the tubules was found. In eighteen cases (*i.e.*, 22 per cent.) there was compression of both ureters, as evidenced by their dilatation. This high percentage of gross ureteral changes is in strict accord with what Herzfeld previously noted when working at the subject eleven years ago, and he seems to regard it as a typical condition in eclampsia, but adds that bilateral compression of the ureters has only been observed by him in primiparæ in whom the disease made itself manifest at the onset of labour. This change was never found after death from eclampsia in multiparæ nor in primiparæ in whom the onset occurred either in early pregnancy or *post-partum*. The ureters in the whole of their abdominal course are dilated to the size of a man's thumb; the renal pelvis is likewise much dilated; the condition suggests that the ureter had been compressed at the point where it crosses the pelvic brim at the division of the common into the internal and external iliac arteries. From thence downwards the ureters are normal in size. This change in the abdominal part of the ureter cannot be brought about by sudden compression, inasmuch as there is no mural thinning of these ducts, but, on the contrary, the walls are thickened. The growing uterus and the fœtal head must afford the source of the pressure which brings about the compression, and the ureter is normally protected from such compression by the fact that it crosses at the bifurcation of the common into the internal and external iliac arteries. If this arterial division takes place at a higher or lower level than usual, the ureter is more exposed to pressure, and it is an established fact that the right ureter is more exposed than the left, as the former crosses the pelvic wall over the external iliac at a lower level, and enters the pelvis at an acute angle, whilst the latter takes a higher and straighter course into the pelvis.

Now, in cases of dilated ureters in eclampsia, Kundrat has found such variations in the division of the large arteries as are above described, and they are therefore to be considered as a predisposing cause of this condition. The longer delay of the hard fœtal parts in the pelvis of primiparæ is given as the explanation of the occurrence of dilated ureters in this class of patient. In rachitic pelves the ureters are more protected by the widening of the transverse diameter of the inlet than they are in normal pelves. On the other hand, these ducts are more exposed in the case of the small round pelvis—that

is, provided the abnormal division of the large vessels is present to act as a predisposing cause. It does not follow from what has already been stated that after the recovery of a primipara from eclampsia she will suffer in the same way in future pregnancies, as the child's head will not be likely to remain so long in the pelvis upon subsequent occasions, but we may conclude that when eclampsia is ushered in during the early stages of a first delivery compression of the ureters is extremely frequent. Thirty-two cases of the eighty-one showed hæmorrhagic hepatitis. In twenty-one there was no change in the liver—at least, microscopically. Acute nephritis, and more or less grave heart lesions, were also found.

Herzfeld concludes by stating that eclampsia is an intoxication process brought about by grave renal changes, which by inadequacy of excretive function cause the retention of poisonous waste products in the maternal blood. In cases of anuria occurring early in the labour of a primipara, with presumably dilated ureters, Herzfeld suggests Cæsarean section as the most hopeful treatment.

Cornual Pregnancy; Rupture; Mummified Fœtus.—GLOCKNER (*Verhandlungen der Gesellsch. für Geburts.*, 1900) writes of a woman, aged twenty-three, admitted into a hospital for pains in the right of the hypogastrium, traced to a kick from a horse three years previously. The period was delayed till the nineteenth year; it was irregular at first, but became quite regular. The period had ceased for three months. The uterus was $2\frac{3}{4}$ inches long, the left appendages normal, whilst on the right side lay a tumour 'half again as big as a fist,' irregular and tuberous. Pregnancy in the right tube was diagnosed. Abdominal section was performed; then the mass was proved to consist of a mummified fœtus of the fourth or fifth month, connected by a long, flat band with the uterus at the level of the os internum. From the outer aspect of the band sprang the right appendages. This band was, therefore, the shrivelled, imperfectly developed right cornu, in which the fœtus had developed; it bore posteriorly a scar indicating the site of rupture. There was no recent corpus luteum in the right ovary, but a well-developed one in the left, indicating a phenomenon already observed in cornual pregnancy. The fœtus, the sac, and the right appendages were removed; there was no canal in the lower part of the ill-developed cornu communicating with the cervix. The patient recovered.

The Anatomy and Histology of Tubal Gestation (CORNIL and WEINBERG: *Rev. de Gynécol. et de Chir. Abdom.*, Sep. and Oct., 1901).—The writers give the results of their study of microscopic sections of early unruptured tubul pregnancy, with special reference to the structure of (*a*) the decidua reflexa, (*b*) the decidua serotina, (*c*) the tubal mucous membrane in the neighbourhood of the ovum. They consider that the tubal *decidua reflexa* is formed

exactly as the uterine decidua reflexa, by the mucous membrane of the tube growing round the ovum and completely enveloping it. The free surface of the tubal decidua reflexa, which projects into the lumen of the tube, is covered with plicæ, which are lined by a single layer of cells, sometimes cubical, sometimes cylindrical in shape. In fact, the covering of the ovum is exactly like that of the rest of the lumen of the tube into which it projects. Below the lining epithelium is a layer of vascular connective tissue, in which a few muscle fibres are seen. Still nearer the ovum the connective tissue contains a number of large decidual cells. Here, contained in blood spaces, are the chorionic villi, covered by masses of syncytium (nucleated protoplasm undifferentiated into cells). No ampullary layer is found either in the decidua serotina or reflexa, this being attributed by the writers to the absence of glands from the tubal mucous membrane. The *decidua serotina* possesses no lining epithelium. Decidual cells are found in the submucous tissue, and also in the deeper structures of the wall as far as the subperitoneal connective tissue, but there is no ampullary layer. In some places the decidua serotina, in contact with the ovum, is lined with a thick layer of Langerhan's cells, on which are masses of syncytium. In parts of the tube-wall, sometimes at considerable distances from the surface, similar masses are found, and in many places isolated masses, surrounded by decidual cells, are found at a distance from any chorionic villi. Many blood-vessels in the wall of the tube are lined by plasmodium identical in appearance with syncytium, even in places where no villi are to be seen. Some of these blood spaces are lined partly by plasmodium and partly by endothelium. The writers think that some of these plasmodial masses probably arise from maternal elements (decidua), and not from the ovum (chorionic syncytium). In some places chorionic villi penetrate the tube as far as the subperitoneal layer. There is a general hypertrophy of tubal mucosa in the neighbourhood of the ovum. The plicæ are elongated and often adherent to each other, thus forming little spaces lined by epithelium. Some of these little spaces contain extravasated blood. In places hæmorrhages have occurred just below the epithelium, so that the extravasated blood is contained in spaces which have, for that part of their walls which faces the lumen of the tube, a single layer of epithelial cells, sometimes flattened by pressure, sometimes cylindrical. In the deeper part of the tube-wall there are dilated vessels, extravasated blood, masses of leucocytes, and bloodvessels here and there obliterated by a process analogous to arteritis obliterans.

Treatment of Extra-uterine Gestation (*Cent. für Gynäk.*, No. 42, p. 1163).—Before the Naturforscherversammlung of Hamburg KRÖNIG of Leipzig contributed an article upon this subject. He states that the principles of treatment must be influenced by the

anatomical researches of Füth, Aschoff, Kühne, and others. As there is no decidua formed from the tubal mucous membrane, the ovum invades the muscular layers, the chorionic epithelium dissecting up and destroying the connective tissue and musculature; the villi advance continuously towards the serosa. When this is reached, in most cases a thin fibrous lamina is developed at the placental site, which, by thickening the wall at the dangerous area, tends to prevent a rupture. Aschoff affirms that in the majority of tubal abortions occurring between the second and third months, a rupture of the tubal wall beneath the organized clot or connective-tissue thickening of the serosa exists; in fact, a so-called hidden rupture takes place. The explanation of the rupture is that the cells of Langerhan's layer produce a *gradual* destruction of the tubal wall. The open rupture differs from the hidden in that, with the first, after a spreading erosion of the tubal wall, the last layer (viz., peritoneum) is *suddenly* split to such an extent that it cannot acquire a fibrinous covering, so that grave internal hæmorrhage is the immediate result. Aschoff and Füth have determined that, after the complete expulsion of the ovum, villi—even if only a few remain—can continue their work of destruction upon the tube. Having regard to the continuous destructive action of Langerhan's cells on the tubal wall, Werth considers the condition as a malignant process, and says that it should be treated as such.

There is a divergence of opinion as to how an unruptured gravid tube in the first month should be treated, where there is not much bleeding, and where a definite hæmatocele has formed. Prochownik concludes from a review of his own cases that conservative treatment gives the best results. Out of 139 cases, the conservative plan was adopted by him in 92, and early operation in 47. Krönig gives the results obtained by expectant treatment, elytrotomy, and laparotomy in tabular form as follows:

I. Patients able to Resume their Entire Work.

Expectant Treatment.	Elytrotomy.	Laparotomy.
41 in 56 = 73 %	19 in 25 = 76 %	24 in 38 = 63 %

II. Patients able to do a Conditional Amount of Work.

Expectant Treatment.	Elytrotomy.	Laparotomy.
15 in 56 = 27 %	6 in 25 = 24 %	13 in 38 = 34 %

III. Patients unable to Work.

Expectant Treatment.	Elytrotomy.	Laparotomy.
0	0	1 = 3 %

It is commonly asserted that the expectant treatment keeps patients from work for such a long time that only the better classes can afford

to submit to it. In Leipzig it was found that of 56 women treated in this way 14 returned to their work immediately after leaving hospital, 25 within six weeks, 15 within twelve weeks, 2 within nine months. In the 25 elytrotomies, 4 women returned to work at once upon leaving hospital, 13 within six weeks, 8 within twelve weeks. In 38 laparotomies, 1 woman resumed work at once after leaving hospital, 19 in from one to six weeks, 10 in from six to twelve weeks, 5 in from twelve weeks to six months, 1 after twelve months, and 1 not at all. The subsequent fertility of women who have undergone immediate operation for extra-uterine gestation has been examined by Prochownik. He found that in his cases 39 women conceived after operation, and 40 after the expectant treatment. (This was presumably in the 139 cases above referred to.) According to Prochownik, the cases operated upon take the precedence in the question of future fertility over those which are treated by the expectant method. There are two dangers in the expectant treatment: (1) Renewed bleeding, and (2) decomposition of the hæmatocele. Owing to the first danger, cases put on the expectant treatment have sometimes to be operated upon later for sudden internal hæmorrhage. The statistical comparison between cases of ectopic fœtation which admit of expectant treatment with those in which immediate operation is called for seems artificial and useless, inasmuch as the former class comprises only the most favourable cases, in which fatality is reduced to a comparative minimum, whereas the operative class necessarily must include many cases of a much more serious character.

GYNÆCOLOGY.

Fibroma Free in the Abdominal Cavity.—Jacobs (*Bull. de la Soc. Belge de Gyn. et d'Obstet.*, vol. xii., No. 3, 1901) describes a case where a large fibroma was removed by operation from the abdomen of a woman only twenty-one years of age. The period had been regular till eighteen, then it became irregular. There had been for two years steady increase in the size of the abdomen, without any attacks of pain or tenderness. At length the swelling became so bulky as to interfere with the patient's comfort and duties. There was abdominal distension most marked in the upper part of the belly and in the flanks. The tumour could be defined reaching from the hypochondria to a little below the umbilicus. Its mobility was but slight. It was smooth above, irregular below, firm in consistence, and apparently fluctuated on pressure over certain points. The uterus was anteverted and freely movable; the tubes and ovaries could be detected on palpation free from the tumour. The patient

was in robust health. A pedunculated fibroid or a cyst of the ovary was suspected. At the operation the tumour was found to have a smooth, shiny, white surface. A big lobe, clearly solid, was drawn through the abdominal wound, and then a fluctuating lobe could be defined lying above and fitting into the diaphragm. This lobe was tapped, and a great quantity of a yellowish-brown fluid removed. The entire tumour then came out of the wound. It was connected with nothing except the great omentum, which had greatly dilated vessels, which were ligatured and divided. The uterus, ovaries, kidneys, and liver were all carefully examined; they were neither displaced nor bore any trace of a pedicle. The tumour and the fluid it contained weighed 33 pounds. The solid part was entirely made up of fibrous tissue, and bore very few vessels. The punctured lobe was a very capacious cyst; its inner coat was covered with a white deposit, supposed to be fibrine from a clot. Jacobs considers that this tumour could not have originated save from the uterus or ovaries, although he expressly admits that those organs were small and normal, and showed no trace of a pedicle. The possibility of the development of fibroma in an omental cyst might be entertained by some pathologists, but the operator implies that the omentum was normal and spread over the surface of the tumour, to which it adhered and which it nourished. Its origin seems enigmatic.

Large Uterine Fibroid in a Girl—Death from Sloughing.—Jacobs (*Bull. de la Soc. Belge de Gyn. et d'Obstet.*, vol. xii., No. 2, 1901) adds to medical literature a case of uterine myoma in a patient only twenty-one years old. She was tall and strong, and the catamenia did not appear till she was thirteen; they were regular and free. For a few months severe menorrhagia had occurred, followed by fœtid discharge, and it was noticed that the abdomen had increased in size till it had become greatly swollen. There was a large, round, movable tumour, rising to above the umbilicus and continuous with the cervix, which was patulous and very soft. Black masses of slough escaped freely. The patient seemed to be a virgin, but the fœtor suggested retention of fœtal relics, though discharge of a sloughing fibroid would have been diagnosed without hesitation had the patient been older. She was put under the anæsthetic; then the cervix was dilated, and a huge mass of sloughing fibroid removed. Another mass just as big was then detected in the uterine cavity. As bleeding had been set up in removing the last fragments of the detached mass, Jacobs thought it best to wash out the cavity and to pack it with iodoform gauze; then hysterectomy would be performed when the patient improved in health. She at once, however, got worse; artificial serum was injected, but bedsores formed, and there was œdema of the left leg. On the third day Jacobs performed hysterectomy. The uterus was of the size of an adult

head and very anæmic, like the patient's whole body. There was no intraperitoneal effusion; retroperitoneal amputation above the cervix was first effected, and not a drop of sanies was allowed to escape from the cervical canal. The cervix was then separated by the thermo-cautery after ligature of the uterine and ovarian vessels. Then the vagina was closed, and the pelvic floor reconstituted by suture; no drainage was employed. At first all went well. A week later the abdominal wound had united perfectly. Unfortunately, the general condition remained very bad. The swelling of the left leg did not subside; there was distinct phlebitis. The patient grew weaker and weaker, and died suddenly on the sixteenth day, presumably from embolism. Death was certainly due in part to blood-poisoning from the sloughing of the fibroid, and the second operation had deferred rather than hastened it. Jacobs' case shows that not only may uterine fibroid develop in a girl, but that it may undergo changes grave enough to end fatally. Herbert Spencer, Cuthbert Lockyer, and others have written recently on uterine fibroids in women under twenty-five years of age. In Lockyer's case (*Brit. Med. Journ.*, vol. ii., 1901, p. 956) the patient was twenty-two, and the tumour was an œdematous fibromyoma, partly cystic; its solid part weighed 2 pounds. It was threatening to develop prejudicial changes, as in Jacobs' case.

'Desmoid,' or Fibroma of Abdominal Wall in Women.—FÜTH (*Verhandlungen der Gesellsch. für Geburts.*, 1900), in relating two cases of this well-known form of tumour, noted Guerrier's statistics, which included forty-four cases, of which only two were in men. Olshausen had come across twenty-two cases of desmoid tumour in the last twelve years. There is often a clinical history of pregnancy associated with the appearance of a growth of this class, and in other cases a clear history of traumatism. The majority are seated in the sheath of the rectus, and possibly arise from hæmatomata, which are apt to develop in pregnancy. Lehmann has described a case of hæmatoma which he detected in a woman who had strained the abdominal muscles a week previously when stumbling in the street. By the aid of absorbents the hæmatoma disappeared, but Olshausen considered that it might under unfavourable circumstances have developed into a desmoid tumour. This kind of tumour is often observed, it is said, for the first time during pregnancy; such was, at least, the case in five out of Olshausen's twenty-two cases, and in one of Füth's two patients. This clinical fact does not prove that in any one of the six the tumour originated during pregnancy, but it is certain that a 'desmoid' has been observed to grow much more rapidly during than before a pregnancy. The great majority of patients subject to this tumour are young women between twenty and thirty-five, often healthy, sometimes fat.

Gyn. Staff Room University Hospital.

The pathology of this tumour is an important matter. Füth, admitting that it is often strictly a pure fibroma, declares, on clinical evidence, that it is always haunted by the ghost of malignant degeneration. No doubt it seems to spring, histologically, from tendon, and often the abundant connective tissue between the bundles of white fibre has been inaccurately described as 'sarcoma,' especially when altered by œdema, yet the after-history of an operation has shown no recurrence; nevertheless, a 'desmoid' has not rarely proved to be a sarcoma, and Sänger has reported a very definite example. It lay in the tendon of the right external oblique, and had been observed for three years. At first very small, it suddenly began to grow till it attained the size of a large apple, then it was removed. It had invaded the deeper muscles and extended into the preperitoneal space. Six weeks after the operation there were signs of recurrence, and the patient died three months later.

Diagnosis is generally easy, as the desmoid, even when developed in the posterior part of the sheath of the rectus, projects very prominently under the skin even when small, contrary to the rule of abdominal tumours, which do not project forwards till they are large and press against a wide area of the parietes. The desmoid is easy to grasp, but cannot be moved upwards and downwards, whilst small uterine myomata and ovarian fibromata are often easy to draw upwards and push downwards. But errors of diagnosis are not uncommon. In one instance, where the patient had been pregnant, the tumour was taken for an ovarian growth adherent to the parietes. In a second case a firm myoma of the anterior wall of the stomach, and in a third a cancerous gall-bladder adherent to the parietes, were diagnosed as desmoid growths of the abdominal wall. Menge, in discussing Füth's cases, mentioned a case of tumour of the abdominal wall in his own practice. It grew very slowly, but at length the skin over it became immovable; malignancy was then suspected. The tumour was removed, and proved to be an endothelioma of the abdominal wall, but its immobility under the skin was due to complication with an omental hernia. Desmoid tumour of the abdominal wall is clearly a distinct type of growth, clinically speaking, but it is associated with other and less innocent forms of tumour.

Hæmaturia with Uterine Fibromata.—HARTMANN (*Ann. de Gyn. et d'Obstet.*, Sep., 1901) records two cases in which hæmaturia was found in association with a hard, round tumour, in one case the size of a marble, in the other the size of an orange, situated between the uterus and the bladder. In each case the bladder was opened above the pubes, and the tumour proved to be extravesical, and to consist of a fibromyoma springing from the front of the uterus. The cystoscope in the second case had shown

a rounded projection into the bladder, covered by a very congested mucosa. Treatment in the first case consisted of scraping the surface of the tumour from the bladder, and superficial cauterization with the thermo-cautery. No treatment is mentioned in the second case. The cases are recorded to call attention to an unusual feature in the clinical history of myomata, and to the symptomatic value of vesical hæmaturia.

Vaginal Enucleation of Submucous and Interstitial Fibroids, with or without Morcellement by Unilateral or Bilateral Cervico-vaginal Hysterotomy (ARTIGUES: *Rev. de Gynécol. et de Chir. Abdom.*, Sep. and Oct., 1901).—In an elaborate paper the writer describes the method recently employed by Segond in twenty-five cases for the removal of submucous and interstitial fibroids *per vaginam*. Curettage and swabbing of the uterine cavity are first employed, if not rendered impossible by projecting fibroid masses. In addition to the instruments generally used for vaginal hysterectomy, three others are commonly employed: (1) a special speculum of the 'duck-bill' variety; (2) a knife having a two-edged, lancet-shaped blade, which is slightly curved on the flat, and with a long handle; (3) corkscrews in two sizes.

The patient is anæsthetized and placed in the lithotomy position. The anterior and posterior lips of the cervix are seized with volsellum forceps, and the uterus is drawn down as far as possible. By means of scissors an incision is made on one side of the os externum extending as far as the vaginal reflection. If necessary, this incision is prolonged along the whole of the lateral wall of the supravaginal cervix and uterus towards the opening of the Fallopian tube. If this incision is found insufficient, it is repeated on the other side, so that the uterus is practically split into an anterior and posterior half. Hæmorrhage is not, as a rule, troublesome if scissors are used. In only two out of twenty-five cases has Segond found it necessary to clamp bleeding vessels in the incised uterus for more than a few minutes. The finger is now inserted into the uterine cavity, and a careful bimanual examination is made, so as to ascertain the exact size and position of the fibroid nodules. The capsule of the fibroid is next incised, and by means of scissors and the finger the tumour is enucleated from its bed completely, or as completely as possible. If complete enucleation is impossible, a corkscrew is inserted into the most prominent part of the tumour, and by means of the knife a cone-shaped portion of the tumour is scooped out of the main mass, and withdrawn like a cork. This is repeated as often as necessary, and the tumour is eventually shelled out of its bed. The bed of the tumour shrinks considerably. What is left of it, together with the uterine cavity, is then plugged with gauze. Finally, the incisions in the uterine walls are closed by cat-gut sutures.

The Etiology of Hydrosalpinx (POMPE VAN MEERDERVOORT: *Rev. de Gynécol. et de Chir. Abdom.*, No. 4, July and Aug., 1901).—The writer draws attention to two varieties of hydrosalpinx:

1. A cylindrical swelling of a blue colour, with walls as thin as paper. In this variety there are no adhesions, and the broad ligament is normal.

2. The walls of the tube are thick and adherent to surrounding tissues, and the broad ligament is also thickened. This condition only differs from pyosalpinx in that it does not contain pus. The microscopic appearances are identical with those of pyosalpinx, and there is no doubt that the condition is inflammatory in origin.

It is quite different with the first variety, and the writer thinks that the two are due to different causes. He considers the first variety to be dropsical in nature. He supposes that the normal secretion of the tubal mucous membrane is serous in character, and that under certain circumstances this serous secretion may be excessive in quantity, and, becoming pent up, may give rise to hydrosalpinx. He considers that this hypersecretion may occur during menstruation and pregnancy; also in some cases of fibroid tumour of the uterus, and during the period that immediately precedes the menopause. He thinks that an inflammatory process may attack and close the fimbriated end of such tubes, or that the epithelium, having been shed, the denuded fimbriæ may become adherent. He cites a case of 'dropsical' hydrosalpinx occurring in a woman aged fifty-four. The tumour grew rapidly. Before removal it was tapped, and its walls immediately contracted and the plicæ reappeared. There was no sign of inflammation beyond the occlusion of the fimbriated extremity.

The Operative Treatment of Accumulations of Pus in the Uterine Appendages (MAUDE and BÜRGER: *Archiv. für Gynäk.*, vol. lxiv., p. 1, 1901).—These writers prefer the vaginal to the abdominal route when operating upon accumulations of pus in the uterine appendages, while they admit that circumstances may exist which make it necessary to open the abdomen. The removal of the tubes and ovaries from both sides for bilateral suppurative disease by the abdominal route is condemned as having all the disadvantages of laparotomy without securing a permanent favourable result. The removal of the ovary and tube from one side is admissible only when the other side is perfectly healthy, and when the disease on the affected side is completely quiescent. This must be ascertained by patient observation before the operation is undertaken. The removal of ovaries, tubes, and uterus should be done by the abdominal route, only when it is impossible to remove the organs by way of the vagina. The removal of uterus, ovaries, and tubes by the vagina has, in the hands of the writers, been followed by greater success, both

immediate and ultimate, than any other operation. It should be chosen not only when both sides are affected by suppurative disease, but also when, one side having suppurated, the appendages of the opposite side are affected by chronic atrophic changes. The removal by the vagina of the appendages of one side, leaving the uterus and the appendages of the other side, is only admissible when the retained adnexa are perfectly healthy, and when the disease upon the affected side has been under observation long enough to make sure that it is completely arrested. Drainage of accumulations of pus by means of incisions from the vagina should be reserved for a few cases in which it is obviously and definitely indicated, and similarly drainage by abdominal incisions should only be used in those cases in which, owing to the position of the pus, this is clearly the proper treatment to adopt.

Gas in the Fallopian Tube.—MAUCLAIRE (*Bull. et Mém. de la Soc. Anat. de Paris,* April, 1901) notes a condition that some systematic writer may classify some day as 'physosalpinx.' A woman aged twenty-seven was under treatment in the Hôpital Bichat, under Picqué, in April, 1901, for inflamed appendages following the puerperium fourteen months earlier. Pelvic pain had grown very sharp during the last week or two. A tender right salpingitic tube as big as a Tangerine orange was detected on bimanual palpation. On abdominal section, the diseased tube was found adherent to the side of the uterus, and more posteriorly to the omentum and small intestine. In separating the tube from the uterus it ruptured, and a little pus escaped, then some gas issued from the cavity of the dilated tube. It was free from putrid or fæcal odour. Then some rather suspicious pus escaped. The tube was easily removed. It adhered to intestine, but was readily separated, and there was no communication between the intestinal and tubal canals. A Mickulicz gauze drain was passed into the pelvic cavity, and the patient made a good recovery.

Dermoid Cyst inserted on the Mesentery: Tumour of same Type on Ovary.—ALEXANDRE (*Bull. et Mém. de la Soc. Anat. de Paris,* April, 1901) describes a true cystic tumour which was removed by Schwartz from a patient seized with sudden, acute abdominal pain. Its surface was dull white. Behind, it was attached immediately in front of the aorta to the left side of the mesentery by a pedicle consisting of two layers which could be peeled off the surface of the cyst without any need of the knife. This pedicle was not highly vascular; it had probably become twisted. The tumour, a dermoid cyst, was absolutely independent of both ovaries. The left ovary was normal, the right was converted into a dermoid cyst of the size of a fist, which was easily removed. Alexandre makes no comments on this case. The presence of a dermoid tumour of the

right ovary seems to imply that the other dermoid was of ovarian origin. This type is very common, and non-ovarian dermoids are extremely rare, though dermoid pelvic tumours have been seen in males. Beyea (*American Journal of Obstetrics*, vol. i., 1900, p. 433) describes twenty-two cases of these dermoid cysts of the pelvic connective tissue, including De Quervain's, where the patient was a man aged fifty-eight.

The precise anatomical and pathological relations of Alexandre's mesenteric tumour is not explained; such knowledge is hard to attain during a properly-conducted operation. The observer implies that it was the mesentery that was reflected on to the cyst, forming two layers behind it as a pedicle, but he does not distinctly state the fact. True mesenteric cysts may be pedunculated (Gottschalk and others), though the majority are sessile. Granting that this tumour was primarily seated between the folds of the mesentery, the situation of a true mesenteric cyst, it should be noted that Braquehaye collected nine cases of dermoid cyst of the mesentery (*Archiv. Gén. de Méd.*, vol. ii., 1892, p. 301). The valuable essay, 'Traitment des Tumeurs Solides du Mésentère,' by Bégouin (*Revue de Chirur.*, 1898), should be studied by the gynæcologist or surgeon who suspects a tumour of this kind.

Corpus Luteum Attached to Fallopian Tube.—Lefas (*Bull. et Mém. de la Soc. Anat. de Paris*, April, 1901), in examining a specimen removed by operation, discovered an aberrant corpus luteum. The specimen consisted of the uterus, tubes, and ovaries removed by M. Segond for chronic disease of the appendages. To one of the fimbriæ of the right tube was attached a little round tumour of the size of a nut. On section, this tumour, which was perfectly separate from any other structure besides the fimbriæ which formed its pedicle, was found to contain a cavity full of blood. Microscopical examination showed that this remarkable growth was a true corpus luteum.

Acute Strangulation in Neck of Herniated Operation Cicatrix.—Durand (*Lyon Médical*, November 17) reports a case of high interest to operators who know the great trouble which hernia of an abdominal cicatrix may cause, as well as its possible complications. A woman aged thirty-six was seized with very acute symptoms of strangulation. Four years before the attack she was delivered of her first child, and underwent during the puerperium an operation of the nature of which she was not sure, but recovery was long, and the abdominal wound was dressed very frequently. The cicatrix remained strong till five months before the intestinal complication, then a pouch formed, which at length became as big as a large apple. Two attacks of local pain and vomiting occurred within a fortnight. The sac was laid open and a black mass incised. This mass consisted of a collec-

tion of cysts quite separate from the cavity of the sac, the peritoneum, intestine, or genito-urinary tract. Behind the cysts, inside the sac, lay a coil of congested intestine, tightly strangulated by the neck; otherwise the case presented no peculiarities. The nature of the cysts remained obscure; they were suspected to arise from the inclusion of epidermic elements, but were possibly of peritoneal origin. The first operation might have simply been a free incision into an abscess developed during the puerperium; bad herniæ sometimes follow that simple proceeding.

Posterior Parametritis.—Paul Bröse (*Zeitsch. für Geburts. und Gynäk.*, Bd. xlvi., Ht. 1) writes on the pathology and treatment of this affection, first described by B. S. Schultze as being an inflammatory one, having its seat in the tissue of Douglas's folds. Douglas's folds of peritoneum cover the utero-sacral ligaments, which consist of firm connective tissue with smooth muscle and elastic fibres, and play an important part in preserving the normal position of the uterus. Inflammation of these ligaments may be met with in the acute stage, in the chronic stage, with tendency to repeated acute exacerbations, and finally in the form of a persistent cicatricial contraction. W. A. Freund describes among the forms of circumscribed parametritis one which he calls atrophic paraproctitis, in which bands of scar tissue are found taking the course of Douglas's folds; this affection corresponds to Schultze's posterior parametritis. The changes designated by these names cause the cervix to be dragged backwards, and as a consequence the body of the uterus to be turned or bent forwards, or to one or other side, according to the fold affected.

In the course of laparotomies undertaken for the treatment of displacements of the uterus, Bröse has paid special attention to the occurrence of posterior parametritis, and he has performed the operation of ventro-fixation of the uterus as a means of treatment of ten cases in which posterior parametritis was diagnosed as the essential lesion. The diagnosis was made before operation by examination *per rectum*. The signs on which the author relies for the diagnosis of the condition consist in thickening, loss of elasticity, and shortening of the utero-sacral ligaments, which in some cases during operation were seen to form thickened and prominent ridges. Küstner considers that very frequently these signs are caused by perisalpingitis and perioöphoritis. Bröse believes that even in those cases where the uterine appendages are adherent and thickened inflammatory changes in the cellular tissue coexist. In five of his ten cases no trace of peritonitis was present; the appendages were quite free, and the uterus anteflexed. In the other five cases the peritoneum in the neighbourhood of the ovaries and tubes was more or less affected.

The author concludes from his observations that Schultze's posterior parametritis is essentially a disease of the connective tissue, although affection of the pelvic peritoneum frequently coexists. For its treatment, when other means fail, ventro-fixation, even when the uterus is anteflexed, is an excellent method.

On the Operative Treatment of Genital Prolapse.—MANDELSTAMM, of Odessa (*Monats. für Geburts. und Gynäk.*, Sep., 1901), contributes reports of seven cases operated on by Freund's method, or Wertheim's modification of Freund's method, and shortly reviews the operative treatment of prolapse. W. A. Freund in 1895 first made use of the body of the uterus to close a very severe case of vesico-vaginal fistula, and obtained a good result. Speaking of this and another similar case, Freund thought the operation would not be of very wide application, but believed that the body of the uterus could be more used as 'plastic material' in gynæcological work. In 1896 Freund carried out his theory, and applied his method for the cure of severe prolapse of the genital organs in old women. The common causes of genital prolapse are: (1) weakening of connective-tissue supports, ligaments, etc.; (2) increased abdominal pressure; (3) increased yielding of the pelvic floor, by atrophy of muscle or injury.

Until recent times the operative treatment of prolapse was practically limited to the last of the three etiological factors. For the cure of this condition operations for repairing the perineum and for narrowing the vagina and vulval outlet were made use of. The bad results of these operations in severe cases next led to the attempt to consolidate the relaxed ligaments of the uterus, to shorten the round ligaments by the Alexander-Adams operation, or the sacro-uterine and round ligaments by the method of Wertheim and Bode, etc. Next came the operations for producing new attachments, ventro-fixation and vaginal fixation, and, finally, complete, removal of the uterus and resection of the vagina as a *dernier ressort*. The latter operation, it was hoped, would produce a firm cicatrix, binding rectum and bladder together, and well suspended by the stumps of the broad ligaments. The numberless operations described for the cure of prolapse show how bad the results have been in the past, and the reasons for these bad results are not far to seek. In patients past the menopause the pelvic connective tissue is everywhere atrophic, and quickly allows of stretching under any form of treatment. The pelvic floor muscles being weakened or atrophic, the anterior vaginal wall, exposed to the full pressure of the abdominal contents in the erect position, stretches, and allows the bladder to bulge downwards, forming a cystocele. This cystocele exerts a constant drag on the uterus if present, and on any scar tissue if the uterus has been removed, and so recurrences occur after all operations.

W. A. Freund applied his method of operating to the cases of elderly women past the menopause, in the hope that better results would occur than with previous methods. The steps of the operation were as follows:

(*a*) Oval surfaces were dissected bare on the anterior and posterior vaginal walls, to which the fundus uteri was to be stitched.

(*b*) A transverse incision was made through the posterior fornix into Douglas's pouch.

(*c*) The fundus was retroverted, and pulled through this opening into the vagina.

(*d*) An opening was made at the fundus into the uterine cavity, to let out any possible discharges.

(*e*) The fundus was stitched to the previously freshened surfaces with catgut sutures.

(*f*) The operation was concluded by a perineorrhaphy after Lawson Tait's method.

The healing process progressed by first intention, the bladder and rectal functions were normally performed, and the final result was excellent. Wertheim, in 1899, performed a modification of this operation, pulling the fundus through an incision in the anterior fornix, after separating the bladder and opening the vesico-uterine peritoneal pouch, finally stitching the cut edges of the wound round the cervix, and the posterior wall of the fundus to a freshened surface on the anterior vaginal wall. This modification gave excellent results, and, at the same time, allowed the vagina to remain as a potential passage, allowing any secretion to flow away from the cervix, which in Freund's method might be retained by the posterior vaginal sutures.

The author's seven cases were operated on in the Jewish Hospital in Odessa; all except one were elderly women past the menopause. All had very severe prolapse, which offered no chance of cure by any of the older methods in use, as previous experience had shown that recurrences nearly always occurred in such cases. The healing process in all the cases was good, and only two had rises of temperature—one due to an attack of pleurisy, and another to an attack of influenza. In one case it was necessary to make an artificial opening after Freund's method into the fundus uteri, and from the sides of this opening a large granulation tumour appeared. This, however, was easily cured by removal and stitching the mucous membrane to the serous surface. The results in all were good, and up to the time of writing no recurrences had taken place. The explanation of the good result of this operation seems to be that the broad ligaments are made tense by dislocating the uterus into the vagina; the fundus itself, stitched to the vaginal walls, forms a solid unstretchable prop to the bladder; and these, acting together,

form a much more powerful pelvic diaphragm than any other method in use up to the present time. The conclusions drawn by the author are as follows :

1. The plastic application of the uterus by Freund's method is a great acquisition for the treatment of severe prolapse.

2. The technique of the operation is easy, and with aseptic precautions is devoid of danger.

3. Freund's original method is only necessary in exceptional cases, where the uterus is increased in size from long prolapse. In such a case fixation to the posterior wall as well as the anterior is indispensable.

4. For all ordinarily difficult cases one can use Wertheim's modification, combined with plastic operations on the perineum and posterior vaginal wall, as occasion demands. Wertheim's modification is especially useful, because it leaves the vagina sufficiently open for sexual functions.

5. As a general rule, only cases past the menopause will be operated on by this method ; but if a radical operation is necessary in a younger woman, then it is easy to resect the Fallopian tubes through the vaginal wound, and so prevent further conception.

Further experience is no doubt wanting in this method of operating. If the results turn out to be as lasting as they promise, then the operation will be a real addition to our resources. Nothing could well be more unsatisfactory than the treatment of severe prolapse by the older methods.

The Surgical Treatment of Backward Displacements of the Uterus.—HIVET (*La Gynécologie*, August, 1901) deals exhaustively with this question from the point of view more especially of the intra-abdominal shortening of the round ligaments. He considers that shortening of these ligaments is the most satisfactory surgical procedure for retroversion, especially from the point of view of after-results, and in the event of pregnancy. He prefers the intra-abdominal plan to Alexander's, because adhesions and morbid conditions of the appendages can be dealt with, and because the strongest portion of the round ligament, viz., the uterine portion, can be made use of for fixation. This is especially the case in the procedure of Doléris, in which the round ligament is passed through a slit in the peritoneum, muscle, and fascia of the anterior abdominal wall, and fixed to that and to the round ligament of the other side, which has been similarly treated. Hivet gives the indications, not for surgical interference, but for non-interference. These fall into four groups of cases in which operation should not be undertaken : (1) Cases in which the displacement causes no symptoms ; (2) displacements which can be kept reduced by a pessary ; (3) displacements curable by massage ; (4) displacements which form a part of

a general visceral ptosis. The after-results of different operations are inquired into from the point of view of their influence on conception, pregnancy, and labour. The last two are shown to be less frequently interfered with by shortening of the round ligaments than by ventro- or vagino-fixation.

Wertheim's Operation for Cancer of the Uterus (STAPLER: *Rev. de Gynécol. et de Chir. Abdom.*, No. 4, July and Aug., 1901). —Previous disinfection of the vagina or removal of malignant tissue by curette or cautery is not attempted. An incision is made from the umbilicus to the pubes. The ureters are easily seen in women wasted with cancer. The peritoneum over them is raised with forceps, and carefully divided with scissors from the brim of the pelvis towards the broad ligament. The bladder is then dissected from the front of the uterus, the round and infundibulo-pelvic ligaments are tied and divided, and the ovaries are removed. The ureters, now easily seen, are carefully avoided, while the uterine artery is ligatured. This done, the uterus is pulled upwards, so as to put the uterosacral ligaments on the stretch. These structures are then ligatured close to the rectum and divided. Carefully avoiding the ureter, as much parametric tissue as possible is removed. The rectum is separated from the vagina, and it is now possible, by means of scissors and finger, to isolate the vagina nearly down to the vulva. The vagina is next drawn upwards and clamped at the sides by two powerful pairs of forceps curved at right angles, then divided below the forceps, and uterus and vagina are removed. Hæmorrhage in the cut vaginal wall is arrested by a row of stitches bringing the outer surface and inner lining into contact. A small strip of iodoform gauze is then placed in what remains of the vagina. A minute dissection is now carried out in the tissues of the pelvis, particularly along the large vessels, and all lymphatic glands are removed. The peritoneum of the bladder is then sutured to that of the rectum, and the ureters are covered in by uniting the peritoneum over them. Finally, the abdominal wound is closed. In 18 out of 57 cases Wertheim found, by microscopic examination, that there was glandular infection—*i.e.*, in 31·5 per cent.

The writer admits the following disadvantages of the operation:

1. It is a long operation, lasting for 1—1½ hours, and patients already exhausted by cancer do not stand it well. In the first series of 30 cases 12 died from the operation—*i.e.*, a mortality of 40 per cent. In a second series of 27 cases there were 5 deaths—*i.e.*, a mortality of 18·5 per cent., or a total of 57 cases with 17 deaths, giving an operative mortality of 29·8 per cent.

2. The ureter, separated from surrounding structures, is badly nourished, and may necrose. In order to prevent this, it is important to leave the ureters attached to the surrounding tissues as much as

possible, and before closing the peritoneum to stitch them to the neighbouring structures. Catheterization of the ureters is unnecessary and dangerous; but it must be remembered that the tissue which surrounds them is usually invaded by the cancer at an early stage of the disease. It seems difficult to believe that the ureter can, by the most careful dissection, be separated from its cancer-infiltrated bed of parametric tissue without some minute portions of infected tissue being left attached to its walls, even if those walls are not themselves infiltrated. The same remark applies to the bladder and rectum, though these structures are not usually involved at so early a stage of the disease as are the tissues surrounding the ureters. The writer points out that it is too early as yet to estimate the results of this operation as far as recurrence of the disease is concerned.

Operation for Recurrent Carcinoma.—In the *Cent. für Gynäk.*, No. 41, p. 1141, G. KLEIN records a case in which he performed abdominal extirpation of recurrent carcinoma one year and nine months after vaginal hysterectomy. Secondary growths were removed from the parametrium, omentum, and wall of the bladder. The omentum contained two cancerous nodules. There were three carcinomatous nodules the size of cherries on the bladder-wall. The involved omentum was removed, the ureters freed, but not raised from their bed, in order to avoid necrosis. The paravesical and parametric growths were removed with scissors. The bladder was emptied and washed out with permanganate of potash solution; its walls were resected in removal of the growths down to the mucosa, but as that was not implicated it was left intact. The most difficult part of the operation was freeing the left ureter, which lay under the new growth, but the latter did not surround the duct, so it was not resected. The vagina was divided in the upper one-third, so that the tissues removed comprised the ovaries, tubes, parametria, omentum, and upper third of vagina, all united into one mass. The vaginal wall was oversewn to prevent bleeding. Up to the third lumbar vertebra no enlarged glands were found. The bottom of the wound was plugged with iodoform gauze, over which the peritoneum was drawn to shut out the vaginal lumen. Slight cystitis followed, but the patient left the hospital twenty-two days after operation.

Case of Ovarian Teratoma.—In the *Cent. für Gynäk.*, No. 37, p. 1036, GLOCKNER reports the case of a girl of sixteen years from whom he removed an ovarian teratoma in which there was a remarkable development of nervous tissue. In addition to the usual sebum, hair, teeth, bones, and cartilage, all visible to the naked eye, the microscope revealed skin and its appendages, glandular structures with cylindrical epithelium, and nerve-tissues. In the latter gray substance preponderated, and in this were found pyramidal ganglion cells, and a heart-shaped central canal lined with cylindrical epi-

thelium, in which were situated choroidal plexuses. The ganglion cells resembled spinal ganglia; nerve plexuses, mostly of the non-medullated type, were also present. Other ganglia showed an arrangement similar to sympathetic ganglia connected with the posterior roots of the spinal cord, in addition to which embryonic rudimentary eye-tissue was distinguishable in the shape of choroidal pigment and cell layers resembling the granular layer of the retina.

A Contribution to Experimental Uretero-cystostomy (CLARENCE A. SMITH, M.D., Washington: *Amer. Jour. of Obstet.*, Sep., 1901). —The author gives the results of a series of experiments he has conducted to determine the form of suturing that will most securely hold the ureter to the bladder when there is tension on the former, and to observe the relative powers of resistance of different sutures applied to the ureter. The first experiments refer to the best method of passing the sutures through the ureter when these are to be subjected to a strain. This was determined by finding the weight required to tear out the suture in the different ways of passing it. When the suture was passed transversely and into the lumen of the ureter, the average weight required was 2 lb. 6 oz.; when passed longitudinally and through the lumen, 1 lb. 3 oz.; when passed transversely through the muscle and fibrous tissue, but escaping the lumen, 1 lb. 7 oz.; when passed longitudinally in the same way, 12 oz. These results are very interesting, for, as is pointed out, the method of suturing generally adopted in the operation of uretero-cystostomy is the fourth in this series, the weakest that can be used to withstand tension. In the second series of experiments uretero-cystostomy was performed on five cadavers, and the organs then removed. Smith found that with an oblique implantation of the ureter with transverse sutures passing through the lumen of the ureter, the average weight sustained was 3 lb. 5 oz. In two of these cases the ureter itself tore across before the sutures gave way under weights respectively of 3 lb. 8 oz. and 4 lb. 8 oz., with a direct implantation. The average weight sustained was only 2 lb. 6 oz., the same method of suturing being adopted in passing through the lumen transversely. In these experiments it was found that the elasticity of the ureter permitted a gain in length of from $\frac{1}{2}$ inch to 1 inch without endangering its integrity, though hitherto it had been supposed that a gain of 2 inches was available by this means. In the third series of experiments the operation of uretero-cystostomy was performed five times on dogs with shortened ureters.

The conclusions drawn from all these experiments are:

1. It is practicable to anastomose the ureter to the bladder under tension if the two are securely held in apposition till firm adhesions form.

2. This relation can be obtained by an extraperitoneal oblique implantation which the author describes.

3. An additional length of ½ inch to 1 inch can be safely obtained by traction on the ureter.

4. The presence of a ligature in the lumen of the ureter is not injurious, because nature conceals it beneath new epithelium.

The Relationship of Deciduoma Malignum to Hydatid Mole (BONNAIRE and LETULLE: *Rev. de Gynécol. et de Chir. Abdom.*, No. 4, July and Aug., 1901).—The authors consider that deciduoma malignum arises from the syncytium covering the chorionic villi, and not from the decidua itself; that the disease is therefore the result of an infection of the maternal organism by a malignant growth arising from an ovum. Two complications of pregnancy are closely associated with this condition: (1) vesicular disease of the chorionic villi; (2) abortion. Metoz (*Thèse de Paris*, 1900) has collected ninety-eight cases of deciduoma malignum, and of these forty-eight followed vesicular mole. Under these circumstances the disease usually ensues quickly (four to eight months) on the expulsion of the diseased ovum, but it may occur as late as two years afterwards.

The authors record the following case: A patient, aged thirty-one, pregnant for the second time, and who last menstruated on August 16, had two ova removed from the uterus on October 15. The first was the size of an egg, and normal in appearance; the second was an enormous mass of vesicles. The uterus was then packed with iodoform gauze. On October 17 the uterus was swabbed out with chloride of zinc solution, and again packed with iodoform gauze. On November 6 it was proposed to curette the uterus, but the patient refused the operation. On November 12 there was severe hæmorrhage, which continued until the 18th, when vaginal hysterectomy was performed. The patient was very exhausted and anæmic at the time, and died on November 20 of shock. The uterus was the size of the fœtal head at term, its cavity was dilated, and in the region of the right cornu was an irregular fungating mass the size of a hen's egg.

Microscopic Appearances.—In the tumour were found (1) villi undergoing atrophic changes; (2) villi proliferating and forming buds. The stroma of the villi was fibrosed. On the surface were large masses of richly nucleated protoplasm (plasmodium), in some places directly attached to the stroma, in others separated from it by clearly defined polygonal cells (cells of Langerhan). In places the plasmodium had undergone vacuolation. The mucous membrane of the uterus and superficial layers of the muscular wall were in a necrotic condition, and scattered through this necrotic tissue were—(1) masses of leucocytes; (2) large isolated cells (cancer cells). In the deeper layers of the muscular wall proliferating villi, having the same

appearances as those above described, were found within the blood sinuses. The plasmodial masses were seen infiltrating the muscular tissue surrounding the sinuses, and growing for the most part in a direction perpendicular to the muscle fibres. From the periphery of these invading masses large cells had apparently detached themselves, and were found isolated at some distance from the primary plasmodial masses. In this case the cells of Langerhan did not appear to have shared in the infiltration of the tissues, as described in other cases.

Having in view the possibility of the occurrence of deciduoma malignum, the authors would treat every case of vesicular mole as follows: careful removal of the mole, and immediate plugging of the uterine cavity with some antiseptic material; this to be followed in a day or two by swabbing of the uterine cavity with creasote or chloride of zinc; ten or fifteen days later thorough curettage of the uterus; if uterine hæmorrhage persists, the removal of the uterus. The authors insist that it has been demonstrated beyond a doubt that the plasmodial masses found on the surface of the normal growing ovum, and from which the malignant elements in some, if not all, cases of deciduoma malignum apparently arise, are always developed from the ovum (chorion). It is therefore interesting to note in the next number of the same journal (*Rev. de Gynécol. et de Chirurg. Abdom.*, Sep. and Oct., 1901; *vide* abstract of paper, p. 99) that Cornil and Weinberg maintain that in tubal pregnancy the plasmodium may arise from decidual cells, and not only from the syncytium of the chorionic villi.

Deciduoma Malignum.—The origin of the malignant tumours of the uterus that arise in connection with pregnancy and the puerperium, and are best known by the name of 'malignant deciduoma,' is still a matter of controversy. The usual opinion held in this country appears to be that the tumours are sarcomata, possibly modified by the concurrent stimulus of pregnancy, but that no sufficient proof has been afforded that they take their rise in the decidua, still less that they may be derived from the fœtal chorionic villi. KARL WINKLER (*Zeitsch. für Geburts. und Gynäk.*, Bd. xlvi., Ht. 2) has carefully investigated and described two cases that occurred in the practice of Küstner. The first case occurred in a 3-para, aged thirty-three; the symptoms dated from a presumed abortion, which occurred six months before her death. At the autopsy a large tumour of the body of the uterus was observed, with metastases in the cervix, vagina, and lungs. The second patient died about a year after passing a hydatidiform mole, and was found to have a large tumour of the uterus, with secondary deposits in the vagina, the left broad ligament, and the lungs. In the primary tumours and metastases of both these cases two distinct forms of cells were found,

the one round or polygonal, with a single nucleus, the other consisting of bands of protoplasm, with numerous large nuclei, but without definite cell division. The author enters into a long description of the nature and origin of these two varieties of cells, and bases his conclusions on the examination of the placenta, decidua, and chorion, at different stages of pregnancy.

Along with the spindle cells which compose the loose connective-tissue meshwork of the normal decidua are found two elements that can be clearly differentiated from the rest of the tissue—viz., round cells and large polynucleated masses of protoplasm. The round cells are found in all stages of pregnancy, even at term, as well as in the remains of the decidua found on the uterine placental site after labour; they mostly lie in groups, and acquire a polyhedral shape by mutual pressure. These cells are found in the early stages of pregnancy, in typical collections, in the decidua serotina, and they recur in the decidual framework of the placenta as far as its finest divisions; they can be easily observed in the placenta cast off at any stage of pregnancy, as well as in the decidua itself. Notably different from these cells is the second variety, which agrees in its characteristics with the covering found on the chorionic villi that is generally known as the syncytium. According to the observations of the author, these syncytium-like masses are found early in pregnancy in the deep layers of the decidua serotina, lying among the contiguous muscle elements of the uterine wall, and side by side with glands showing marked epithelial proliferation. The name of 'syncytoblasts' is proposed for these polynucleated masses of protoplasm, and the author believes that they, and the similar syncytial tissue covering the chorionic villi, have a common origin in the maternal tissues, and, indeed, in the connective tissue of the decidua. This view is fundamentally different from previous opinions as to the origin of the syncytium; the majority of observers derive this tissue from the fœtal epiblast, while those who have supported the theory of its maternal origin have referred it to the epithelium covering the surface of the uterine mucous membrane.

Winkler dismisses the theory that one of the kinds of cells found in cases of deciduoma originates in Langerhan's layer. In his opinion the characters of the two varieties of cells found in the tumours described by him agree completely with the characters of the two varieties, the round cells and the syncytoblasts, found in the decidua. Since both these latter originate, according to his researches, in maternal connective tissue, he concludes that in the affection under observation we have to do with a sarcoma that takes its origin in the decidua at the placental site either of the gravid or of the puerperal uterus. The name 'deciduoma' is the best to apply to the tumours on account both of their histological structure and of

their tissue of origin. The conclusions thus arrived at are not likely to meet with instant acceptance in this country. In the first case related, the proof that abortion had taken place is not convincing, and the last pregnancy before the suspected abortion occurred four and a half years before the death of the patient. In the discussion which took place at the London Obstetrical Society in 1896, the general consensus of opinion was that the syncytium is derived from the outer layer of the fœtal epiblast, and Webster pointed out that whereas the decidua serotina and vera undergo the same early changes, syncytium is found on and in the former at a very early stage, but never in relation to the vera until the chorion læve has touched it. Moreover, it appears to be unnecessary to trace the origin of the polynucleated cell masses of deciduoma to the syncytium at all. Eden and the late Dr. Kanthack showed in the discussion just mentioned that similar appearances were found in rapidly growing sarcomata from other parts of the body as well as from the uterus.

REPORTS OF SOCIETIES.

OBSTETRICAL SOCIETY OF LONDON.

Wednesday, December 4, 1901, Dr. Peter Horrocks, *President, in the Chair.*

Cancer of the Cervix and Pregnancy.—Dr. R. Sanderson read a paper on a case of pregnancy of four and a half months, complicated by epithelioma of the cervix uteri, in which he had performed vagino-abdominal hysterectomy. Finding that the epithelioma was operable, he removed the uterus and the growth by a combined vaginal and abdominal operation, without previous induction of labour. The specimen and microscopic section of the growth were described and shown. He discussed ethics and the treatment adopted under the following heads: (1) That where pregnancy and operable cancer of the cervix co-exist the life of the mother is alone to be conidered; (2) that anterior to the fourth month of pregnancy vaginal hysterectomy is the orthodox treatment; (3) that after this period the alternative methods are (*a*) induction of labour followed by vaginal hysterectomy, and (*b*) hysterectomy, without induction of labour, by a combined vaginal and abdominal operation; (4) that the latter of these alternatives, having regard to the improved statistics of abdominal hysterectomy, was in this case to be preferred.

Dr. W. H. Tate questioned whether it was necessary to run the risk of a vagino-abdominal hysterectomy in such a case, and believed that the operation might have been more safely performed by the vaginal route alone. By making a longitudinal incision through the cervix, and emptying the uterus of its contents, it is possible to remove a uterus in which the pregnancy had advanced to the sixth month, if not later. Six years ago Dr. Tate had treated a case of carcinoma of the cerxix complicating a five months' pregnancy by the older method of inducing abortions, and removing the uterus *per vaginam* ten days later. Although the case was a favourable one for operation, the disease rapidly recurred.

Mr. J. H. Dauber would like to hear in three or five years' time if Dr. Sanderson's case were alive and well, and he hoped the Society might be informed on this point. He himself had had a similar case under his care in 1898. He emptied the uterus and then waited for its involution, when he performed vaginal hysterectomy. Recurrence occurred within eighteen months. Dr. W. S. A. Griffith agreed that vaginal hysterectomy after emptying the uterus was at present the best operation, the mortality being very low, and the prolongation of life in many cases considerable. Dr. Amand Routh said that vaginal hysterectomy could be performed at a much later date than that of a four months' gestation. By incising the anterior uterine wall along its centre as it is pulled down into the vagina, the contents can be readily evacuated. The uterus promptly retracts, and its size is so

materially diminished that its removal becomes easy by the vaginal route. The alternative procedure to this operation in such a case would be somewhat as follows: First, a temporary removal of the cervical growth by scissors, gouge, or cautery, treating the stump with pepsin dressings to digest any sloughs; secondly, induction of abortion; and thirdly, in a week's time to allow some involution to take place, vaginal hysterectomy. In early pregnancies he much preferred the former plan. In every case the uterus should be emptied before removal *per vaginam*. Dr. HERBERT SPENCER agreed that it was not necessary to resort to abdominal section in this case. In a recent paper by E. Alterthum, a list of eighteen cases was given in which the uterus was thus removed, all the cases recovering. Nevertheless, there was tendency at the present time to operate by the abdomen in these cases, not for the simple removal of the uterus, as in Dr. Sanderson's case, but in order to remove the broad ligament and glands as widely as possible. This operation received support from the researches made in Professor Rosthorn's clinic which showed that 57·5 per cent. of cases of cancer of the cervix in the operable stage had already the glands infected, and therefore a vaginal operation would be useless from the point of view of cure. If these researches were confirmed they would considerably alter our views upon the treatment of cancer of the uterus. As far as he knew the results had not been good, but a sufficient time had not elapsed to allow us to judge of the chances of 'cure.' At the present time he (Dr. Spencer) believed that in the case under discussion a better operation would have been high amputation with the cautery, followed by removal of the ovum. He thought also that high amputation after induction of abortion was a good operation, if the growth was not in a septic condition. He had not had a case of early pregnancy complicated by cancer in an operable stage, but in three cases of cancer complicating labour he had amputated the cervix and part of the lower segment after delivery, and the patients were now well after eight and a half, six, and five years. He did not know of such good results after any kind of hysterectomy for cancer complicating pregnancy. The PRESIDENT agreed that it was nearly always justifiable to consider the mother alone when both she and the child could not be saved, though he thought it might so happen that it would be justifiable to save the child. He agreed with those who advocated the vaginal route, and even where the uterus was too large he advocated the induction of labour and then waiting until involution had proceeded far enough to allow of vaginal extirpation. Moreover, in the earlier states of pregnancy he considered it bad practice to try and drag an unemptied pregnant uterus through the opening made in the vaginal roof; it was far better to rupture the contents, thereby reducing the bulk of the uterus to a minimum, before extracting it. The removal of the cancerous mass first, leaving the uterus to be dealt with afterwards, had not been considered by the author, but he agreed with Dr. Routh that it might in some cases be practised with advantage. In operating he used numerous short forceps, grasping very little tissue, and removed them in thirty hours. In this way, by the help of formalin

douches, offensive discharges following upon the operation were reduced to a minimum.

Dr. SANDERSON, in reply, recognised the justice of the criticisms in the debate on this case. He, however, found it difficult to understand why a combined hysterectomy should be a more severe operation than a vaginal or an abdominal one. Whether the cervix was circumcised from below or whether from above, as in Doyzen's operation for abdominal hysterectomy, could make little or no difference in the severity of the operation; and he believed that in the future, as abdominal methods improved, that the abdominal or combined route would be preferred to the vaginal.

GLASGOW OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY.

Wednesday, November 27, 1901, ROBERT JARDINE, M.D., President, in the Chair.

Pyosalpinx and Puerperal Septicæmia.—Dr. ROBERT JARDINE read notes of a fatal case of puerperal septicæmia originating in a double pyosalpinx. The patient, aged twenty, 2-para, was delivered by forceps, on June 4, in the Glasgow Maternity Hospital. On the third day of the puerperium the temperature, previously normal, rose to 101° F., and the pulse to 130, and by next day temperature was 102° F. Although the lochia were sweet and there was no suggestion of sepsis in vagina or uterus, treatment by intra-uterine douching and quinine was resorted to. On the fifth day the abdomen became distended and painful. Diarrhœa had been present from the first, and, as typhoid was suspected, the blood was examined. Unfortunately, a doubtful Widal reaction was obtained, which led to delay until another specimen was examined, which proved negative. The patient gradually sank, and died on the ninth day of the puerperium from septic peritonitis. The temperature varied from 100° to 102·6° F., the pulse from 100 to 130; but just before death the temperature rose to 104° F. At the post-mortem examination the interior of the uterus was found to be quite healthy. The Fallopian tubes were, however, distended with pus, and the right was evidently the source of the fatal peritonitis, as purulent necrotic material was found at the ostium. The lower part of the abdomen contained a quantity of curdy pus, especially on the right side, while the intestines generally were distended and slightly glued together. Had the doubtful Widal reaction not maintained the suspicion of enteric fever, Dr. Jardine would have opened the abdomen, as an early operation might have saved the patient. Dr. Jardine referred to an almost identical case which he saw in consultation some months previously, when he diagnosed tubal mischief as the cause of infection. The symptoms were the same at the onset—viz., profuse diarrhœa and fever. There was, further, a history of gonorrhœa in the husband two years previously. The importance of these two cases lies in the fact that the source of puerperal

septicæmia is not always to be sought for in the uterus and vagina only.

Gangrenous Ovarian Cysts—Ventro-fixation for Prolapse.—Dr. J. Crawford Renton read notes of cases of abdominal section illustrating points of interest. Five of these were cases of gangrenous ovarian cysts, four being operated on, and all recovering. In three cases the condition was due to twisting of the pedicle from right to left; in the fourth a thrombus in the pedicle had cut off the blood-supply. The fifth case was of special interest, as it was seen along with the late Dr. Thomas Keith, who advised tapping. From the appearance of the fluid, Dr. Keith was satisfied that he had to deal with a gangrenous cyst with a twisted pedicle, and he advised delaying an abdominal section. The patient passed through an illness of subacute septicæmia, the knee-joints being affected; but she gradually recovered, and is to-day quite well.

Dr. Renton next discussed the operation of ventro-fixation of the uterus for prolapsus uteri. He advocated stitching the fundus uteri nearer the umbilicus than is usually done, to avoid the bladder trouble he had noticed when the uterus was stitched low down to the abdominal wall. He used two sutures of chromic gut carried through the recti muscles, and stripped off the parietal peritoneum for a space of 1½ inches before fixing the fundus to the bottom of the wound.

Lactosuria during Lactation.—Dr. Carstairs Douglas read a paper on the occurrence of milk-sugar in the urine of nursing women, with a note on the best means for its differentiation from grape-sugar. He had made ninety-one observations on fifty-six cases in the Glasgow Maternity Hospital, and found lactosuria present in at least 85 per cent. It was most marked in the early days of lactation, and might persist for four or five days after lactation ceased. There was no simple, positive test for milk-sugar in urine. It did not answer well to phenyl-hydrazine, and fermented slowly with yeast; so if it was found, on testing the urine, that a sugar was present which answered to these characteristics, one might reasonably assume it to be lactose. Dr. Douglas had sometimes found Ruizard's method answer, in which the urine was boiled with 10 per cent. of hydrochloric acid. This converted the lactose into glucose and galactose. The phenyl-hydrazine test, which at first was negative, would now be positive, yielding crystals of phenyl-glucosazone.

Owing to pressure upon our space, Reports of other Societies are unavoidably held over until the next issue.—Editor.

REVIEWS OF RECENT BOOKS.

Outlines of Gynæcological Pathology and Morbid Anatomy. By C. Hubert Roberts, M.D. Lond., F.R.C.S. Eng., M.R.C.P., Physician to the Samaritan Free Hospital for Women; Physician to Out-patients, Queen Charlotte's Lying-in Hospital; late Demonstrator of Midwifery and Diseases of Women, St. Bartholomew's Hospital. With 151 illustrations, mostly original. London: J. and A. Churchill, 1901.

This new text-book clearly represents several years of careful preparation, and its author has enjoyed the advantage of much experience, both in teaching and in the practice of his speciality. The book itself forms an imposing volume of 332 pages, but the type is large and clear, so that there is no excess of letterpress. There is also a satisfactory index, and the footnote references are sufficient but not overwhelming. Hence, 'Gynæcological Pathology,' being something above a manual, is well suited for the advanced student, and at the same time convenient for reference when an expert in diseases of women desires to consult its pages. Thus the student can learn here the most accepted views about endometritis, extra-uterine pregnancy, and other stock subjects; whilst the gynæcologist will find references to the latest monographs on the rarer forms of tumours of the genital tract, types of diseases which, of course, are not discussed at length so as to encroach on space needed for affections more important on account of their frequency.

No doubt it is relatively easy to prepare concise paragraphs on primary sarcoma of the vagina or primary cancer of the tube, for young pathologists have the will and the power to compile weighty monographs on interesting rarities. Such writings are fairly reliable, and the author of a text-book finds no difficulty in making use of them. There is the new growth and there is the unusual site which it selects, then a percentage can be calculated showing how rare is this rare disease compared to cancer of the uterus or ovarian cystic tumour. Some clinical reports and perhaps tables complete the monograph. Dr. Roberts, himself experienced in the study of rare forms of new growth in the genito-urinary tract, can have had little difficulty in preparing the excellent descriptions of these disorders which adorn his pages.

The more frequent tumours of the uterus and ovaries, and the yet more common inflammatory affections of the genito-urinary tract, are in reality harder subjects to teach and to write about. So much has been published concerning ovarian cysts that it is not easy to select what is essential to the student. Altogether Dr. Roberts has been judicious, his style is neither so light nor so florid as that which characterizes the writings of more than one living authority on the same theme, but in many respects he treats his subject more thoroughly and less personally than any other British or American writer. The now disputed question

about the relative frequency of carcinoma and sarcoma of the ovary is of some importance. The author seems to adhere to the view accepted in this country that most probably the majority of cases of cancer of the ovary are secondary, and occur with cancer of the breast or uterus. He admits, on the other hand, that there is no doubt that primary carcinoma of the ovary occurs, and very properly refers in a footnote to Martin's tables, published only two years since. These tables demonstrate that during the past ten years the Germans have found that primary carcinoma is far more common than primary sarcoma, on the strength, it would appear, of evidence from ovariotomy alone. More might have been added about fibromata of the ovary, for it seems highly probable that many œdematous fibromata have been registered as sarcoma. The importance of dwelling on the pathology of solid tumours lies in the question of prognosis of recurrence after operation. Roberts, we find, entirely agrees with the German school in his statement that more than half the cases of ovarian tumours with papillary growths are adeno-carcinomatous. This seems to coincide with the average operator's experience as he often hears, to his disappointment, of the recurrence of cystic disease of the ovary where he little expected it, just as he is sometimes agreeably surprised to find many years after the removal of a solid 'sarcoma' that the patient remains in perfect health.

The chapter on cancer of the uterus includes sound teaching, and the text and illustrations are here well balanced as teaching agents. Dr. Roberts dwells on the theories as to the parasitic origin of cancer in a special chapter—of considerable value—on micro-organisms in the diseases of women. Some mention is made of Gaylord's recently published researches, which are said to indicate that the cancer germ is a protozoon and not a yeast. The paragraphs on deciduoma malignum have been judiciously prepared, and are most instructive. Dr. Roberts recapitulates foreign views, and all must admit that the French and German pathologists have established a strong case. Still, the author inclines to the British view —maintained by Kanthack and Eden—that 'deciduoma' is really pre-existent sarcoma stimulated by pregnancy. Dr. Herbert Spencer's fine microscopic drawings of a case of deciduoma are published in this text-book. The chapters on uterine fibroids and extra-uterine gestation are of the best quality for teaching purposes, and are also very well illustrated.

Diseases of the vulva and vagina—subjects not difficult to teach—in most respects are, as might be expected, well demonstrated by the author. The same may be said of malformations of the uterus, a subject of which Dr. Roberts has had some obstetrical experience; he notes how, when attending a patient in her fourth pregnancy, he discovered that she had a uterus bicornis hitherto unsuspected. He publishes the diagrams of Giles, who has reminded us more than any other English writer that pregnancy has been known to take place in one or both halves of a uterus didelphys.

There remain for consideration two subjects more or less difficult for teacher and pupil—namely, uterine displacements and inflammation of the

genital tract. Like most authorities of the new school, the author follows the teaching of Matthews Duncan concerning flexions and versions, so it is not surprising to find but four pages allowed for their discussion. Over thirteen pages are granted to major displacements, including prolapse, inversion, retroversion of the graved uterus and pendulous belly. The latter condition, the extreme anteversion of the uterus in advanced pregnancy, with parting or yielding of the linea alba, is rightly included under displacements. As for prolapse, the author has done his best to instruct his readers about the complicated factors of that difficult subject. The classification of causes and varieties is arranged in a more or less tabulated form, which lightens the burden of study appreciably; but the total absence of diagrams and illustrations in this chapter, where they would be specially desirable, is to be regretted.

True inflammation of the uterus, another heavy subject, is treated with fair skill. Practically excluding catarrh of the cervix, all forms are classified under the heading 'Endometritis,' and the author rightly teaches that pathologists are much divided as to the essential characters, especially the seat of origin of the different varieties of uterine inflammation; nor are these varieties easy to define, whilst amongst them are conditions not clearly inflammatory in origin. Inflammation of the ovary, including abscess and tubercle, does not fill three pages, but the author notes, what most authorities hold to be clinically true, that oöphoritis as a real disease, apart from pelvic inflammation, probably does not occur. A primary inflammation certainly complicates some of the exanthemata, but the author is inclined to believe that this oöphoritis serosa is rather œdema, and there is uncertainty, all must admit, about the true pathological origin of the interstitial hæmorrhages in the ovary seen in scarlet fever, typhoid, and Asiatic cholera, upon which the author might have dwelt. He is quite right in not following the example of certain distinguished foreign writers, and teaching the existence of several cut and dried forms of 'oöphoritis acuta, interstitialis,' etc., with subvarieties neatly apportioned to each form, like rations to troops. Such terms aid the advanced pathologist, but mislead the student. Inflammatory diseases of the tube are very well treated by Dr. Roberts, who has devoted much attention to that now showy and familiar branch of pathology. The chapter on General Pelvic Inflammation is excellent, as may be expected from a writer trained in Matthews Duncan's views, but also a keen student of objective conditions, like salpingitis and its consequences, defined since the days when Duncan, Virchow, and others distiuguished parametritis from perimetritis.

The 151 illustrations are, without exception, plates printed separately from the text. A large proportion represent specimens now in London museums, specially drawn by the author for this text-book; a few well-known examples, often re-copied in earlier works, have been re-drawn. These plates of specimens are almost uniformly good, both as proofs of high artistic skill in Dr. Roberts, and as agents of instruction to the student. If some look as though composed of wood or pumice-stone, it is

not the artist, but the effect of alcohol on the tissues of the specimen, that is to blame. Some of the plates deserve more notice than our space permits. We may single out a few: Thus, Fig. 106 shows the cut surface of a primary sarcoma of the ovary very clearly; in Fig. 65 the relations of a cystic fibro-adenoma of the cervix are displayed with great distinctness. The original drawings representing extra-uterine gestation are among the best in this work. The specimens of cancer of the cervix (Fig. 114) is described as 'early stage,' but it involves nearly all the anterior lip. The plates include some good diagrams demonstrating the genital tract and its fœtal and permanent ducts, the effects of atresia on the genital canal above it, etc. We have already suggested that even more diagrams would have been desirable. Lastly, there are a considerable number of microscopic drawings; some of the sections of tumours and of diseased endometrium are not quite so clear as might be wished, but they closely resemble average good sections, whilst similar drawings in many other current treatises are really diagrams, not portraits, of microscopic growths. Thus Fig. 88 gives the appearance generally seen in a fairly successful section of a common ovarian cyst; too often the columnar epithelium is drawn out of the artist's imagination, as though it were a piece of decorative tracing done by machinery. A few drawings of villi in clot from a tubal sac would have been desirable. The total omission of any illustration of this condition so important to recognise is remarkable in a work containing so many fine drawings of specimens of extra-uterine pregnancy. One very good feature about these illustrations is the more or less full explanation in letterpress, which is in no case absent, an excellent arrangement in a work designed to be more or less educational.

'Outlines of General Pathology' is, as we have endeavoured to explain, a text-book of standard value, and we can strongly recommend it to teachers.